
— LOST SYNAPSE • POLYSYNTH MANUAL

Laura

A polysynth with fractal oscillators, wavetables, a sequencer that draws its own melodies, and a filter I tuned by ear.

VERSION 1.2.0 • AU • VST3 • STANDALONE • MACOS • WINDOWS

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Getting started

I built Laura on my own desk over a long stretch of nights and weekends, so I want the first sound you hear from it to feel rewarding rather than fiddly. This chapter exists for that reason. Install it, activate it, hear it. Then, if you want, keep reading.

Install

Your purchase email contains a zip with two folders: `macOS/` and `Windows/`. Open the one for your machine.

MACOS

Inside `macOS/` is a signed and notarised installer, `Laura-1.2.0.pkg`. Double click it and step through the panels. The Customize screen lets you tick or untick each format before installing. By default it puts `Laura.component` (the AU) into `/Library/Audio/Plug-Ins/Components`, `Laura.vst3` into `/Library/Audio/Plug-Ins/VST3`, and the standalone `Laura.app` into `/Applications`. Because it's notarised, macOS opens it without the old "unidentified developer" warning.

If you'd rather place the plugins by hand, the same `macOS/` folder also holds the loose signed bundles. Drag `Laura.component` and `Laura.vst3` into whichever folders your DAW scans.

WINDOWS

Inside `Windows/` is `Laura-Setup-1.2.0.exe`, a signed installer. Double click it and follow the steps. It puts `Laura.vst3` into the shared VST3 folder at `C:\Program Files\Common Files\VST3`, and, if you leave the standalone box ticked, the standalone `Laura.exe` into `C:\Program Files\Lost Synapse\Laura`. Writing into the shared VST3 folder needs administrator rights, so accept the prompt when Windows asks. Because the installer is signed, SmartScreen doesn't flag it.

Activate

Laura runs in two modes: licensed and demo. Both produce sound. The difference is that demo mode mutes the audio for a short stretch every minute, so you can audition the synth fully but you can't print a final track with it.

Your license file is named `Laura.lic` and arrives by email seconds after purchase. To activate, open Laura in your DAW and do one of two things:

- Drag `Laura.lic` directly onto Laura's window. The activation overlay catches it, verifies the signature, and saves the file in Laura's app data folder.
- Open the activation overlay (it appears automatically if no license is found), paste the contents of the `.lic` file into the text area, and press *Activate*.

The whole exchange is offline. Laura never phones home. I want you to be able to install Laura on a studio machine that has no internet and still get a working plugin.

• DEMO MODE

Without a license, Laura is fully functional. You'll see a `DEMO` badge in the top right of the window, and every so often the audio will mute for a second or two. You can dismiss the activation overlay and keep working until you're ready to buy. Saved patches and projects you create in demo mode load identically once you activate, so no work is wasted.

Updating Laura

When a new version is out, Laura shows a small banner in the top right. Click it and an update panel opens inside the plugin. It lists what changed, downloads the new build, checks the download is intact, and launches the signed installer for you. Approve the one system prompt, then restart your DAW (or quit and reopen the standalone) and you're on the new version. If a step fails, the panel hands you a plain download link so you can grab the installer in your browser instead.

One detail worth knowing: a plugin can't replace its own files while your DAW is holding it open, so the update always runs through the same signed installer you'd download by hand. Laura just fetches it and starts it for you. Your patches and your license carry over untouched.

Your first patch in 90 seconds

If you've never opened Laura before, the fastest way to know what it is, is to play a chord on a default patch and then turn three knobs. Here's the script I'd hand someone sitting next to me.

1. Load Laura on a track and play a low C major chord. The default patch is a soft pad, audible immediately. If you don't hear anything, your DAW likely needs a MIDI keyboard or routed clip first.
2. On the OSC A header, click the engine pill that says *Classic* and switch it to *Fractal*. The wave display now shows a slice of a Mandelbrot escape time fractal. You'll hear the timbre change to a wider, slightly metallic pad.
3. Click the *FILTER+* tab on the nav rail on the left. Look at the Drive Mode dropdown. Turn it from *Tanh* to *Mirage*. The pad gets a warm asymmetric bloom around the resonance peak.

4. Find the *Sing* knob on the bottom row of Filter+. Hold the same chord and slowly turn Sing from 0 up to about 0.6. The filter peak grows a vocal quality, somewhere between a body and a vowel.

5. Click the *DICE* button at the top of the window. Laura rolls a new patch. Keep rolling until you find one you like.

That's it. You've heard the synth, two of its filters, and the random patch generator. Everything else in this book is detail on what you just did.

Where things are saved

Three things end up on disk:

- **The license.** Copied into `~/Library/Lost Synapse/Laura/license.lic` on macOS, or the equivalent `%APPDATA%` path on Windows. You can delete it to deactivate.
- **User presets.** Saved into `~/Library/Lost Synapse/Laura/Presets/` as plain XML. You can email a preset file to a friend and it loads cleanly on their machine.
- **Favorites and settings.** Stored as small text files in the same folder. Edit them by hand if you want, sync them through Dropbox if you want, no special format.

The window at a glance



THE VOICE PANEL: VOICE MODE AND GLIDE, OSCILLATOR INTERACTION, UNISON, SUB/NOISE, AND THE FILTER.

Laura's window doesn't hide things. Almost every panel is one click away, and the layout is the same regardless of what you're doing. Once you know the six regions, you know where everything lives.

The six regions

- **Header.** The top strip. Brand wordmark on the left, preset name and favourite heart in the centre, then A/B compare slots, the DICE button, Revert, and Save on the right. The **DEMO** badge sits in the far top right when you're unlicensed.
- **Mod row.** Just under the header. Four macro slots (M1 to M4) and two LFO previews, side by side. Each macro and LFO doubles as a clickable mod source. Hover any of them to see the current routing.
- **Oscillators.** The two big cards in the middle. OSC A on the left, OSC B on the right. Each one is a complete oscillator with its own engine selector, wavetable picker, type pickers, and live visual. The two slots are identical so you can run any combination.
- **Nav rail.** The narrow strip down the left edge. Six destinations: SYNTH, VOICE, MOD, FX, SEQ, and the cog (theme picker and settings). Clicking one swaps the lower workspace. Below the labels, the cog button sits in its own square slot.
- **Lower workspace.** The big region beneath the oscillators. This is whatever the nav rail is pointing at: the modulation editor on MOD, the FX rack on FX, the sequencer on SEQ, voice settings (including the full width Filter+ section) on VOICE.
- **Footer.** The thin strip across the bottom. Peak level meter, active voice count, CPU readout, and the on screen keyboard. The keyboard is playable from your computer keyboard too; see the Keyboard shortcuts chapter for the row mapping.

Why it's laid out this way

I have a personal rule about plugin UIs: every control that's part of "playing the patch" should be reachable in one click from the front page. That's why the macros, the LFO previews, and the oscillator engines all sit on the top page. The lower workspace is for editing, not performing.

If you find yourself jumping between two panels constantly while you tweak (say, MOD to assign and VOICE to hear what changed), use the **Cmd+M** shortcut. That toggles MOD VIEW, a global mode that lights up every parameter that currently has a modulation routing. You can leave it on while you work in any panel and see at a glance where modulations are landing.

The active accent

The nav rail and the lower workspace share an accent colour that depends on which panel you're in. SYNTH is cyan, MOD is purple, FX is gold, SEQ is magenta, VOICE is mint. The background shader picks up the same accent, so you can tell at a glance which panel is showing without reading the label. The full palette comes from the active theme. Pick a different theme from the cog menu and the accents change with it.

Custom colours

Four themes ship with Laura, and there's a fifth slot called Custom that you colour yourself. Open the cog menu, pick Customize colours, and a small editor opens with four accent slots and a colour picker. Those four accents are what the rest of the palette is built from. Pick a slot, choose a colour, and the whole interface re-tints as you go: the panel accents, the LFO badges, the knob modulation rings, and the background shader all follow along. The dark backgrounds and the text stay fixed, so the UI keeps its contrast whatever colours you land on. Your custom palette saves with the rest of your settings and comes back the next time you open the plugin.

LAURA

Init

ENV 1

ENV 2

ENV 3

M1

0%

M2

0%

M3

0%

M4

SYNTH

VOICE

MOD

FX

SEQ

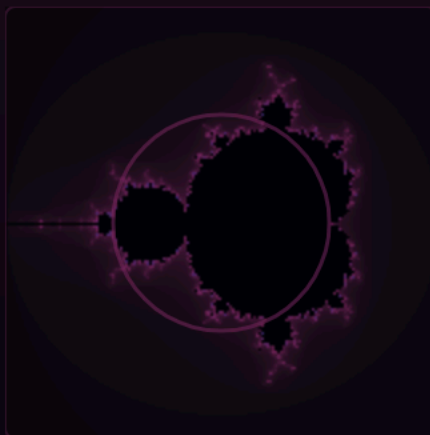
PITCH MOD

OSC A

Src: Fractal

Type: Mandelbrot

Pat

-0.500
Center X0.000
Center Y1.00
Zoom

MOD MATRIX

LFO 1

Cutoff

15%

Off

None

0%

Off

None

0%

Off

None

ENVELO

Custom the

Pick a slot, then

1

red:

green:

blue:

C1

C2

C3

Oscillators

Laura has two oscillator slots, OSC A and OSC B. They're identical. You can run two fractals against each other, pair an analogue model with a wavetable, stack two wavetables, or any other combination. Each slot has its own engine, its own controls, and its own gain into the mixer. They're additive, not exclusive.



THE ENGINE SELECTOR PILL ON EACH OSCILLATOR. THREE FAMILIES, FOUR ENGINES.

The three engine families

Each oscillator slot picks one of three engines from the pill at the top of its card: *Classic*, *Wavetable*, or *Fractal*. The chosen engine determines what the rest of the slot's controls do, so the card layout reshapes itself when you switch.

CLASSIC

The familiar set: Sine, Triangle, Sawtooth, Square, plus a Noise generator. These are anti aliased through a polyBLEP wavetable lookup, not a naive math function, so the saw and square stay clean up into the top octaves. Pick Classic when you want to hear yourself program with the sounds your ears already know. A pad in saw plus sub octave triangle is a classic sound for a reason.

WAVETABLE

The big workhorse. Laura ships with a factory library of wavetables under *System* and your saved ones under *User*. Each table is a set of single cycle frames; the oscillator morphs between them as you turn the *Position* knob (and you can modulate Position from the matrix, so it's a great target for an envelope or a slow LFO). The Wavetable Editor chapter covers how to draw or import your own.

FRACTAL

Laura's oddball, and the engine I'm most proud of. Each frame of the oscillator is a slice through one of six escape time fractals. *Center X*, *Center Y*, and *Zoom* are your map coordinates; every part of the fractal sounds different. Zoomed in on a Mandelbrot near the seahorse valley, you get clean periodic textures. Zoom out and shift to the chaotic edges and you get coarse, almost percussive overtones. Move the coordinates and the timbre walks.

Fractal kernels and the canvas



THE SIX FRACTAL KERNELS. EACH ONE IS A DIFFERENT ESCAPE TIME FUNCTION.

When the engine is set to Fractal, the type pill beneath it picks the kernel. There are six.

- **Mandelbrot.** The classic. Smooth, periodic textures near the cardioid bulb. Get chaotic when you zoom past the seahorse valley. My personal favourite for pads.
- **Julia.** Mandelbrot's cousin. Self similar at small scales, which gives a clean repeating timbre that holds together as you move the playhead through the wavetable position. Pairs well with FM modulation of Position.
- **Burning Ship.** Absolute value variant. Asymmetric, rougher, gritty. Reach for it when you want a fractal that sounds like a fractal rather than a pad.
- **Tricorn.** Conjugate Mandelbrot. Three fold symmetry instead of two. Slightly more vocal, less bell like.

- **Multibrot.** Variable power Mandelbrot. The shape is more star like, the timbre is brighter and more harmonic.
- **Newton.** Newton's method on z^3 minus 1. The most "mathematical" sounding of the six. Crisp, with audible high partials that are clean rather than noisy.



THE FRACTAL CANVAS. DRAG TO NAVIGATE, SCROLL TO ZOOM.

The fractal display in the oscillator card is interactive. Click and drag inside it to move the centre coordinates. Scroll over it to zoom. The current Center X, Center Y, and Zoom values are visible in the corner, and they're all modulation destinations, so you can drive the timbre with an LFO and watch the playhead trace a path across the fractal.

• PATCH TIP

Set OSC A to Fractal on Mandelbrot, then modulate Zoom with a slow triangle LFO at 0.05 Hz and Center X with another LFO at 0.07 Hz. The pad walks through the fractal forever, and because the two LFO periods are incommensurate the patch never quite repeats itself.

— CHAPTER 3, CONTINUED

Per slot controls

Every oscillator slot, regardless of which engine is selected, has the same set of universal controls. Some of them are hidden in the slot's secondary section, some sit on the front of the card.

The four universal knobs

- **Gain.** The slot's contribution to the final mix, in dB. At zero the slot is muted; at unity it's at parity with the other slot. Use this and OSC B's Gain to balance the two.
- **Pan.** The slot's stereo position. Independent per slot, which means you can hard pan OSC A left and OSC B right for an instant stereo patch.
- **Warp.** A per voice phase warp. Off by default. Below 0.5 it bunches the phase early in the cycle (softens the attack of each cycle). Above 0.5 it bunches the phase late (sharpens). I tuned this to be useful, not destructive: even at extreme settings the slot is still musically playable.
- **Detune.** Coarse and fine tune for the slot, in semitones and cents. Run OSC B at minus 12 cents against OSC A for chorus thickness. Push OSC B up an octave for a brighter layered sound.

Wavetable specific

- **Position.** Where in the wavetable the oscillator reads. From 0 to 1. Modulate this for evolving timbres. The visual shows the current frame as a horizontal slider on the wavetable thumbnail.
- **Library button.** Opens the wavetable browser overlay so you can pick a different table without leaving the patch.
- **Edit button.** Opens the Wavetable Editor on the current table. See Chapter 4.

Fractal specific

- **Center X / Center Y.** Coordinates of the centre of the fractal slice the wavetable position walks through. The display in the card shows the area you're sampling.
- **Zoom.** Magnification around the centre. Small zoom = a wide slice of the fractal, varied timbre as Position moves. Large zoom = a tight slice, more uniform timbre but you can pick up fine fractal detail.
- **Position.** The same Position knob as wavetable. On fractals it controls where along the fractal slice you read the waveform.

Classic specific

- **Wave type pill.** Sine, Triangle, Sawtooth, Square, Noise. Each is bandlimited.
- **Pulse width.** Visible only when Square is selected. Sweeps the duty cycle. Modulate this with an LFO for the classic PWM string sound.

The voice extras: sub, noise, ring, FM

The Voice panel hosts a row of four small sections that live underneath the main oscillator pair. They're shared between OSC A and OSC B, and they let you add the things a synth wants but that don't need their own oscillator slot.

Sub osc

- **Sub wave.** A choice of Sine, Triangle, or Square. The sub follows the played note pitch, offset by the Sub Octave setting.
- **Sub octave.** Minus one octave, minus two octaves. Two is a deep low, useful for bass patches that need a foundation.
- **Sub gain.** The sub's level into the mix. Independent of OSC A or B Gain, so a too loud sub doesn't pull the rest down with it.

Noise

- **Noise type.** White, Pink, or Coloured. Coloured is filtered noise with its own internal slope, useful for analogue style hiss or air on a pad.
- **Noise gain.** Mixed in alongside the oscillator output, before the filter.

Oscillator interactions

These let OSC A and OSC B influence each other rather than just sum.

- **Ring mod.** Cross multiplies OSC A and OSC B sample by sample. The result is full of sum and difference frequencies, often with a metallic or bell quality. At 0 the ring is off; at 1 the output is fully ring modulated.
- **FM amount.** Uses OSC B as a frequency modulator on OSC A's pitch. At low amounts you get a slight chorus; at high amounts you get classic FM bell timbres. The ratio between OSC A and OSC B pitches (set with their Detune knobs) decides the harmonic character.
- **Osc Sync.** When on, OSC A's phase resets every time OSC B completes a cycle. This is the classic sync sweep sound. Modulate OSC A's pitch with an envelope to make the sweep evolve.
- **Phase A / Phase B.** Per slot phase offset at note start. Useful when you want the same starting cycle on every note instead of free running.
- **Phase Random.** When on, every note start picks a random phase for both slots. Hides the click that can come from a fixed phase start on transient heavy patches.

Unison

- **Voice count.** 1, 2, 3, 4, 6, or 8 stacked voices per note. Stacking is per slot, so a 4 voice unison on OSC A plus 4 voice on OSC B is 8 oscillator voices per played note. Watch the voice count meter in the footer.
- **Detune.** Spreads the stacked voices in cents. Zero is unison without detune (useful for hard sync stacks). At 30 cents you get a thick chorus. Above 50 cents the stack becomes audibly out of tune in an interesting way.
- **Spread.** Stereo spread of the stacked voices across L and R. Independent of the slot's Pan knob, which applies to the whole stack.

Spectral Blend

Spectral Blend is the section that crossfades OSC A and OSC B in the frequency domain instead of the time domain. The result sounds like one waveform *becoming* the other, rather than the two layered on top of each other. It's one of the features I built into Laura first, because once you have it nothing else feels like an equivalent.

How it works, briefly

Both oscillator outputs are FFT analysed in short overlapping windows. At each window, the analysis bins of OSC A and OSC B are combined according to the current mode, then resynthesised back into the time domain. The Morph knob controls the balance, and the resulting audio replaces the sum of A plus B for the voice.

The three modes

- **Interpolate.** Per bin linear crossfade. Morph at 0 is pure OSC A; at 1 it's pure OSC B; in between the spectrum is a weighted average. The cleanest of the three, with the most predictable behaviour.
- **Mutate.** Per bin random substitution. Morph biases which source each bin comes from, but the choice is randomised per window. The result is glitchier, more digital, and great for percussive evolutions.
- **Cross.** Magnitudes from one source, phases from the other. The biased source provides the spectral shape; the other source provides the time structure. I use Cross when I want a pad to inherit the rhythm of one source and the colour of another. Often it's the most evocative setting.

Controls

- **Morph.** 0 to 1. The crossfade position. Almost always worth modulating with an envelope or a slow LFO.

- **Window.** The FFT window size. Smaller windows (1024 samples) are punchier and follow transients accurately; larger windows (4096 samples) are smoother and pitch accurate but smear the timing of plucks. I usually leave it at 2048 unless I have a reason to change it.
- **Mix.** Wet/dry between the blended output and the raw OSC A plus OSC B sum. At 100 percent you hear only the blended result. At 0 percent the Spectral Blend section is bypassed.

- **PATCH TIP**

Set OSC A to a Fractal Mandelbrot zoomed near the cardioid, OSC B to a Classic Saw, mode to Cross, Morph at 0.6, Window at 2048. The patch sounds like a saw lead that's slowly being eaten by the fractal. Modulate Morph with a slow LFO to make the takeover breathe in and out.

- **CPU NOTE**

Spectral Blend is the heaviest single feature in Laura. If you're running dense polyphony and CPU is climbing, the cheapest fix is to set Mix to 0 to bypass the section entirely. The bypass is total; there's no FFT cost when Mix is at zero.

Wavetable editor

The Wavetable Editor is a full editor, not a preset picker. I built it because I wanted to design my own tables for the factory library, and once it existed it made sense to ship it. Open it by clicking the *Edit* button on either oscillator's wavetable card. The editor opens as an overlay over the rest of the synth, so you don't lose the patch you're in.



THE WAVETABLE EDITOR. FRAME STRIP ON TOP, MAIN DISPLAY IN THE MIDDLE, BRUSHES ON THE LEFT, OPERATORS ALONG THE BOTTOM.

The header

The title of the overlay tells you which slot you're editing. *Wavetable Editor, OSC A* means your edits land on OSC A. *Source* shows the starting material, often the factory seed for a fresh table.

- **UNDO, REDO.** Every action is undoable, including formula evaluations and operator passes. `Cmd+Z` works inside the editor as long as the keyboard focus is in it.
- **A/B.** Compares your work against the unedited source on the fly. Click to flip; useful after a long session to check you haven't drifted away from the sound you were going for.
- **IMPORT.** Drag a wav file onto the editor, or click IMPORT and browse. Laura slices the file into frames of 2048 samples each and loads up to 256 of them. Serum style wavetables, single cycle tables, and even short loops all round trip cleanly.
- **EXPORT.** Save the current table as a wav you can share, back up, or open in another editor.
- **LIBRARY.** Opens the wavetable library without leaving the editor, so you can audition a different starting point and either replace your current edits or open the new table fresh.
- **EMBED.** Bakes the table into the preset itself. When you save the patch, the table travels with it. This is what I do when I want to ship a preset to a friend who may not have the same library installed.
- **CANCEL.** Reverts every change since the editor was opened.
- **DONE.** Commits your edits and closes the editor.

The frame strip

Across the top of the editor, the frame strip shows your frames as small thumbnails, numbered left to right. The currently selected frame is highlighted. Click any thumbnail to switch to it, or use the left and right arrow keys when the editor has focus. The counter on the right reads, for example, *16 / 256 frames*, telling you how many frames are in your table and the maximum the format can hold.

- **< and >.** Step backward and forward.
- **+**. Insert a copy of the current frame after itself.
- **-**. Remove the current frame.
- **CPY, PST.** Copy the current frame to a clipboard, paste it onto another frame. Useful when you want to make one frame the basis for several others.
- **SORT.** Reorders all frames in the table by spectral similarity. After SORT the table morphs cleanly through neighbouring timbres rather than jumping. I run SORT as a finishing pass on hand drawn tables nine times out of ten.

View modes, brushes, and the formula box

View modes

You can view the frame three ways:

- **WAVE.** The time domain waveform. This is where you draw with brushes, and where every operator's effect is most legible at a glance.
- **HARM.** The harmonic content of the frame, drawn as vertical bars. Useful when you want to think in partials, for example removing odd harmonics to make the frame more flute like, or knocking out the fundamental to make it more hollow.

- **3D.** The full wavetable as a 3D waterfall. Drag to rotate. The current playhead position slides along this view at runtime, which is the best way to see how Position modulations affect the sound visually.

Brushes

The Brushes panel on the left of the wave display turns your cursor into a shape stamp. Click and drag inside the wave display to apply the current brush to the underlying samples.

- **Free.** Freehand drawing. The waveform follows your cursor.
- **Line.** Straight line from drag start to drag end. Useful for ramps.
- **Sine.** Half a sine cycle, scaled to your drag region.
- **Up /, Down \.** Linear ramps, ascending or descending. The slope follows your drag length.
- **Exp /, Exp \.** Exponential curves, ascending or descending. Smoother than linear, better for soft transients.
- **Hill, Vall.** A smooth bump up or down. Both are round.
- **Pulse.** A square plateau, with width set by the slider beneath the brush row.
- **Noise.** Filled with shaped noise across your drag region.
- **Step.** Quantised staircase. The step count follows the slider.

The formula box

Below the wave display, the formula box lets you type an expression in `x` (phase, running from 0 to 1) and `tau` (which equals 2π). Press **APPLY** and Laura evaluates the expression at every sample in the frame, replacing the contents.

Some starting points:

- `sin(tau*x)`. A pure sine, the default seed.
- `sin(tau*x) + 0.3*sin(3*tau*x)`. Sine with a touch of third harmonic.
- `2*x - 1`. A sawtooth from minus one to plus one.
- `sign(sin(tau*x))`. A square wave.
- `sin(tau*x) * exp(-3*x)`. A sine that decays inside the frame. Percussive.
- `sin(tau*x) + sin(tau*x*2.3)`. Two sines with an irrational ratio. Inharmonic, bell like.

The formula box accepts the usual operators (+, -, *, /, %), parentheses, and the standard math library functions: `sin`, `cos`, `tan`, `exp`, `log`, `sqrt`, `abs`, `sign`, `min`, `max`, `pow`. Syntax errors are flagged inline; a typo won't apply a broken table.

— CHAPTER 4, CONTINUED

Operators

Operators are one click transformations that change the current frame or a span of frames in a specific way. Below the operators row, three buttons set the scope of the next operator press.

- **FRAME.** Apply the operator only to the current frame.
- **RANGE.** Apply between two anchors you set with shift click in the frame strip. The hint on the right of the operators row tells you the current anchor positions.
- **ALL.** Apply to every frame in the table.

The top row: staples

- **NORM.** Normalise level so the loudest sample reaches full scale without clipping.
- **DC.** Remove DC offset by subtracting the frame's mean. Keeps the waveform centred on zero, which is what the synth voicing assumes downstream.
- **REV.** Reverse the waveform in time. The frame plays backward.
- **INV.** Flip the waveform vertically. Phase invert.
- **SMOOTH.** Low pass smoothing. The slider below sets how many passes. Each press rounds off the shape progressively.
- **PHASE.** Rotate the waveform along the time axis by the slider amount, in samples. A phase realign without editing harmonics.
- **SINE.** Replace the frame with a pure sine, scaled to the current peak. A quick reset.
- **MATCH.** Match the spectral envelope of one frame to another. Useful when you want frame 2 to have the timbre of frame 1 but the pitch contour of frame 3.

The bottom row: spectral and morphological

- **MIRROR.** Fold the waveform symmetrically. Even harmonics survive; odd harmonics neutralise.
- **ASYM.** Skew the waveform left or right of centre. 0.5 leaves it untouched; below or above, it bends.
- **SYNC.** Adds a hard sync flavour by phase multiplying inside the frame. The slider sets the ratio.
- **QUANT.** Bit depth style quantisation. Lower values give a staircase; higher values keep the waveform smooth.
- **LP, HP.** Per frame low pass and high pass, with cutoffs measured in harmonic index. `LP 17` keeps the first 17 harmonics. `HP 4` removes the first four.
- **FM.** Self modulate the frame's phase, so a soft sine grows teeth as you raise the depth.
- **FILL.** Interpolates frames between sparse hand drawn ones. Place key frames at, say, 1, 8, and 16, then press FILL to populate the gaps.

- **SFILL**. Spectral fill. Like FILL but interpolates in the frequency domain. The in between frames inherit the harmonic envelope of their neighbours, which usually sounds smoother.
- **SALIGN**. Spectral align. Rotates each frame's phase so neighbouring frames stay phase aligned, removing the audible click that some hand drawn tables produce on long sustains.
- **X**. Clear the current scope. With FRAME selected it blanks the frame. With ALL it resets the table to silence.

Live preview

Every change is audible immediately. Play a note while you draw and you'll hear the timbre move. The editor crossfades between successive edits so you never hear a click from a draw stroke.

● PATCH TIP

To make a wavetable that evolves, draw two contrasting frames at positions 1 and 16, then select RANGE, shift click anchors at 1 and 16 in the strip, and press SFILL. The frames in between will interpolate in the frequency domain. Modulate Position with a slow envelope and the patch will breathe across its full duration.

Modulation



THE MOD PANEL. THE FILTER, THE THIRD ENVELOPE (ENV 3), A SIXTEEN-SLOT MOD MATRIX, AND THE MSEG MOD-SHAPE EDITOR. FOUR LFOs AND THREE ENVELOPES ROUTE FROM THE TOP STRIP.

Modulation is what turns a static patch into a sound that breathes. Laura's mod system is a flat matrix: every source can target almost every knob, with a depth knob between them. There's no nesting of mod onto mod. I picked that on purpose. A flat matrix is easy to read. That readability means you can come back to your patches six months later and still know what's connected to what.

The matrix

The four matrix rows sit in the bottom half of the MOD panel. Each row is independent and looks like this:

- **Source dropdown.** What's generating the value. Off when the row is unused.
- **Target dropdown.** What the value moves.
- **Depth slider.** How much. Bipolar (negative depths invert the source).

Four rows might sound thin until you remember that almost every meaningful destination has a built in modulator already. The filter has its own filter envelope. The amp has ENV 1. Macros M1 to M4 are themselves combiners that can stack many sources into one. The four matrix rows are for everything the dedicated routings don't cover.

The full source list

Each matrix row picks one of these sources:

- **Off.** Row is unused.
- **LFO 1, LFO 2.** The two general purpose LFOs from the LFO row, after their own depth and rate.
- **ENV 1, ENV 2.** ENV 1 is the amp envelope (still routable to other targets if you want). ENV 2 is the filter envelope by default but is freely routable.
- **Velocity.** The MIDI velocity of the current note. Useful for sample accurate dynamics on top of the dedicated Vel to Cut routing.
- **Pitch Bend.** The host's pitch wheel position. Use it to drive any destination, not just pitch.
- **Key Track.** The MIDI note number, scaled around C4. Lets parameters track the keyboard the way the filter cutoff already can.
- **Seq X / Seq Y / Seq Radius / Seq Angle.** The current XY position of the sequencer playhead on its shape canvas, plus polar coordinates. These let you map the sequencer's shape directly onto a synth parameter, which is one of the more interesting things you can do with Laura.
- **Seq Velocity.** The current sequencer step's velocity.
- **Seq Mod A / Seq Mod B.** The two per step mod lanes from the sequencer. See Chapter 10.
- **Macro 1, 2, 3, 4.** The four macro values. Each macro is itself a combiner that can mix multiple sources before reaching the matrix.
- **Random A / Random B.** Two free running random sample and hold sources. New value at each note start.
- **Pressure.** Per note pressure: channel pressure or polyphonic aftertouch, how hard you're leaning on the note. On an MPE controller it's per note, so one note of a chord can respond while the rest hold still. See Chapter 18.
- **Mod Wheel.** CC 1, latched and held so a note you play after moving the wheel still inherits the current value.
- **Timbre.** CC 74, the slide axis on most MPE controllers. Per note on an MPE rig. See Chapter 18.
- **Myc Value, Myc Grad X, Myc Grad Y, Myc Flow.** The four reads from the Mycelium field, sampled per voice at the note's own spot in the field. Value is the local concentration, the gradients are which way it's flowing, Flow is how fast it's changing. Silent until Mycelium is switched on. See Chapter 17.

The full target list, and how to assign

Almost every important knob in Laura is a matrix target. The dropdown lists them grouped by area.

Targets

- **Filter.** Cutoff, Resonance, Drive, Morph (active on SVF Morph filter type only).
- **Output.** Volume, Pan.
- **OSC A.** Wavetable Position A, Pitch A, Warp Amount A.
- **OSC B.** Wavetable Position B, Pitch B, Warp Amount B.
- **Voice extras.** Sub Gain, Noise Gain, Ring Mod amount, FM amount.

That's the explicit target list. You can also right click any knob in the synth that doesn't appear in the dropdown above and use the local modulation menu, which exposes additional per knob routings that I didn't want cluttering the global target list.

Assigning a modulation

Three ways to do it.

- **From the matrix.** Open a matrix row, pick Source and Target, set Depth. This is the explicit way and the one I recommend when you're building a patch from scratch.
- **From a knob, right click.** Right click any knob to open its modulation menu. Pick a source, pick a depth. The matrix row is created for you behind the scenes. Useful when you know which knob you want to move and you don't want to switch panels.
- **Drag and drop.** Grab the small drag handle on an LFO preview, ENV preview, or macro slot and drop it onto a knob. The depth defaults to a sensible amount; you can fine tune from the matrix afterward.

Active Only and Group

Two buttons sit at the top of the matrix.

- **Active Only.** Hides any matrix row with Source set to Off. When you've got two or three real routings, this collapses the empty rows out of view.
- **Group.** Sorts the visible rows by Source. All LFO 1 routings cluster together, all ENV 1 routings cluster, and so on. Handy on patches with many simultaneous routings; less useful on small patches.

MOD VIEW

Press `Cmd+M` from anywhere in the plugin. Every parameter with at least one matrix routing now gets a thin coloured ring around its knob. The ring is the same colour as the source driving it (LFO 1's accent for one routing, ENV 2's accent for another). The ring's fill animates in real time to show the current modulated value. The exact colours come from the active theme.

I added MOD VIEW because I was building a patch one day and forgot which LFO I'd already used on which knob. Now I leave it on for the whole patch design pass and turn it off when I'm performing.

— CHAPTER 5, CONTINUED

Macros M1 to M4

Macros sit on the top row of the synth, just under the header. Each macro is a single value between 0 and 1 that you can drive from anywhere, and that you can route to any target. A macro takes many sources, mixes them into one value, and that one value can drive many destinations.

I use macros for two things, and I suspect you will too.

- **Expression.** Pick a MIDI CC (mod wheel, fader, whatever you have) and feed it into a macro. Then wire that macro to brightness, resonance, sub gain, and chorus mix. One physical knob now moves the whole patch in a designed way, not a flat sweep.
- **Patch wide morph.** Route an ENV or a slow LFO into a macro, then route the macro to half a dozen knobs. The patch evolves as one shaped curve, not as a tangle of independent modulations.

Assigning sources into a macro

Right click the macro slot at the top of the synth. A menu opens with:

- **Add source.** Pick an LFO, ENV, MIDI CC, sequencer output, or random source. Each new source you add becomes a row inside the macro's combiner.
- **Depth.** Per source depth, bipolar.
- **Curve.** Per source response curve. Linear, exponential, logarithmic, or S curve. The curve shapes how the source value affects the macro before all sources are summed.
- **Clear.** Removes a source row.

Routing a macro out

From the matrix, pick Macro 1 (or 2, 3, 4) as a source, then pick any destination, then set depth. You can route one macro to as many destinations as you have matrix rows for.

MIDI CC into a macro

The fastest way to wire a hardware control to a macro is the MIDI Learn entry in the macro's right click menu. Pick *MIDI Learn*, then move the physical knob on your controller. Laura captures the CC and binds it to the macro for the rest of the session and for the saved patch.

● PATCH TIP

For a one knob "intensity" macro, route a single MIDI CC into M1. Then map M1 to: filter cutoff (positive depth), filter resonance (positive depth), reverb mix (positive depth), and OSC B detune (positive depth). The single CC now shifts the patch from gentle to aggressive across multiple dimensions at once. The curve choice matters: an exponential curve makes the bottom half feel subtle and the top half feel like an explosion.

Envelopes and LFOs

Laura has two envelopes and two LFOs as built in modulators. They sit on the MOD panel, with previews on the top row of the synth so you can see them at a glance without switching panels. Both envelopes and both LFOs have an MSEG mode that replaces the classic shape with a hand drawn curve. The MSEG editor gets its own chapter (Chapter 7); this one covers the classic side.

Envelopes

Both envelopes are ADSR with looping options. The amp is fed by ENV 1 by default, and the filter is fed by ENV 2 by default, but you can re route either of them through the matrix.

- **Attack.** From note start to peak. Measured in milliseconds, exponential curve.
- **Decay.** From peak down to the sustain level.
- **Sustain.** Level held while the note is held.
- **Release.** From sustain down to silence after note off.

Envelope modes

- **1-Shot.** The default. Runs once on note start, holds at sustain while the note is held, releases on note off.
- **Loop.** Loops the attack and decay stages while the note is held. The envelope walks repeatedly from zero to peak and back to sustain. Useful for tremolo style effects without using an LFO.
- **Retrig.** Restarts the envelope on every new note even within a held chord. Off by default; toggle on for plucky patches where each note should re strike independently.

The envelope visual

The envelope card shows the ADSR shape as a draggable curve. You can grab the breakpoints between attack, decay, sustain, and release directly and drag them around. The same edit you'd do with the four knobs, but visual. The shape updates the knobs in real time, so either path is fine.

LFOs

There are two LFOs, full stop. Some earlier drafts of this manual said four; that was wrong. Both LFOs are full featured: shape selector, rate, depth, retrig, phase, fade in, one shot, and a per LFO MSEG mode. They overlay on a shared scope so you can see them together.

SHAPES

- **Sine.** Smooth round modulation. The default.
- **Triangle.** Linear up and down.
- **Sawtooth.** Linear ramp up, instant fall.
- **Square.** Hard alternation between high and low. Adjustable pulse width on the slider beside the shape.
- **Sample and Hold.** A random value held until the next cycle. Steppy, useful for grain density or random pitch jitters.

RATE AND RATE MODE

The rate mode pill toggles between Hz and tempo synced divisions.

- **Hz.** The LFO runs at the Rate knob's value in cycles per second.
- **Synced divisions.** 1/32, 1/16, 1/8, 1/4, 1/2, 1 bar, 2 bars, 4 bars. Plus dotted and triplet variants. The host's BPM drives the cycle length, so the LFO stays locked to the project tempo.

PHASE, FADE-IN, ONE-SHOT

The small ... menu next to the Retrig button opens a popover with three extras:

- **Phase.** Where the LFO sits at note start, from 0 to 1. Useful for syncing two LFOs to start in opposite halves of their cycle.
- **Fade in.** Ramps the LFO depth from zero to full over a chosen time. Lets you start a note dry and have the LFO bloom in.
- **One shot.** The LFO stops after one cycle. Effectively turns the LFO into a complex envelope with a fixed shape.

RETRIG

When on, the LFO resets to its starting phase on every new note. When off, the LFO keeps free running across notes, so a chord shares one phase. Off makes pads feel more cohesive; on makes plucks feel rhythmically tight.

Mod Shape: draw your own modulators

Every modulator slot in Laura (ENV 1, ENV 2, LFO 1, LFO 2) has two modes: the legacy generator (ADSR for envelopes, the five fixed waves for LFOs) and an MSEG mode that plays a multi segment, user drawn curve. The MSEG pill on each slot flips between the two. The Mod Shape card on the MOD panel hosts the editor.

I built the MSEG editor because the fixed ADSR and the five LFO shapes are great until you want something specific and they don't quite get there. Drawing the curve directly is fast, expressive, and the result is part of the preset so it travels with the patch.

Slots and tabs

The Mod Shape card has tabs along the top for the slots: ENV (the filter envelope, ENV 2), LFO 1, and LFO 2. ENV 1's editor lives next to the amp envelope on the SYNTH panel because that's where you'd normally draw an amp curve.

- Clicking the LFO 1 or LFO 2 tab also turns that slot's MSEG mode on, so the editor you just opened immediately drives the sound.
- Clicking the ENV tab does not change ENV 2's mode. Flip the MSEG pill in the card header to switch ENV 2 between ADSR and MSEG. ADSR shows the four knobs; MSEG shows the editor.

Drawing and editing

- **Drag a point.** Click and drag any point to move it. Endpoints stay pinned at time 0 and 1; only their values follow the cursor.
- **Add a point.** Double click on empty space to insert a point at the cursor position.
- **Delete a point.** Double click or right click an interior point.
- **Bend a segment.** Each segment has a small dot at its midpoint. Drag it up or down to bend the curve through positive (slow start) or negative (fast start) tension.
- **Step segments.** Right click on a segment midpoint and pick Step. The segment becomes a hold and then a jump. Useful for staircase and square shapes.
- **Right click empty space.** Opens a template gallery: Reset, Saw Up, Saw Down, Triangle, Square (stepped), Staircase, Random, Exp Up, Exp Down. The same menu carries Mode (ENV / LFO) and Timing submenus.
- **Undo / Redo.** Each editor keeps its own per slot undo stack. `Cmd+Z` and `Shift+Cmd+Z` (Ctrl on Windows) undo and redo while the editor has keyboard focus, which it grabs on any click inside.

Loop and sustain markers

The thin strip just above the curve hosts the loop and sustain markers. Both are stored as float times on the cycle, so they can sit anywhere along a segment.

- Click on empty header strip space to drop the next marker. In env mode it sets sustain at the click time. In lfo mode it cycles loop start, loop end, clear.
- Drag a diamond grip to retime the loop endpoints. The drag has a magnetic snap to any existing point when the cursor gets within a few pixels, plus an optional tempo grid snap if Grid is on.
- Right click a marker to clear it.

Play modes, scaling, and timing

Play modes

The three pills along the bottom of the editor decide what the curve does when it reaches its end and what the gate does.

- **1-Shot.** Run the curve once from start to end. Loop and sustain markers are cleared. On env slots the voice releases when the curve hits its last point (with a short click free tail if the last value isn't zero).
- **Loop.** Wrap the cursor from loop end back to loop start each pass. The default loop spans most of the cycle (from time 0.05 to 0.95) so the grips stay grabbable.
- **Sus.** Sustain mode (env only). Hold the curve at the sustain time while the note is held, then play from there to the end on note off. The cursor jumps cleanly to the sustain value regardless of which segment the marker sits in.

Mode, grid, and zoom

- **Bi / Uni.** Toggles the slot's output range. ENV slots default to unipolar 0 to 1 (so they always drive amp upward). LFO slots default to bipolar minus 1 to plus 1. The Bi/Uni pill is hidden on ENV 1, because flipping the amp envelope bipolar would prevent voices from ever freeing.
- **Grid.** Cycles through off, 1/4, 1/8, 1/16, 1/32. When on, dragged points and dragged loop markers snap to the chosen time grid. The curve area shows the active grid as brighter vertical lines so you see where things will land.
- **Linear all.** Resets every segment's tension to zero in one click. Useful when you want to roll back a tangle of curved segments without grabbing each midpoint by hand.

- **Vertical zoom.** A horizontal slider on the right of the curve magnifies the view around its centre. Set it to 4x to draw fine detail near zero without losing the rest of the curve off screen.

Speed and tempo

An LFO slot's cycle speed follows the LFO's Rate knob, in both legacy and MSEG modes. The rate mode pill next to the row sets the unit: Hz for free running, or any of 1/32 through 4 bars to lock the cycle to host BPM. Picking a sync rate makes the same pill the source of truth across both modes.

ENV slots have no rate knob, so their cycle length comes from the shape itself. Open the right click menu, pick Timing, then either Free run length (0.25, 0.5, 1, 2, 4 seconds) or Tempo sync. Dotted and triplet are toggle items below the sync list.

Where the shape lives in presets

Every slot's full shape (points, tensions, loop and sustain times, mode flag, length, tempo sync settings) is saved per preset and per DAW session. v1.0.x presets that pre date MSEG load unchanged. Flipping an MSEG pill on a fresh patch starts from a sensible default ramp.

• PATCH TIP

For a "human filter" mod: switch LFO 1 to MSEG, draw three peaks of slightly different heights and at uneven intervals, set play mode to Loop, leave Grid off, and route LFO 1 to filter cutoff with a moderate depth. The cutoff now wobbles in a way that's neither random nor metronomic. It sounds like someone with a hand on the knob.

Filter+

Filter+ is the largest section in Laura, and the one I spent the most time tuning. It's a single stereo filter with a selectable type, but the section around the filter (a pre filter drive stage, a series high pass, a per voice cutoff jitter, a saturation feedback inside the integrator on Synapse, a Sing knob that taps the bandpass and folds it back, a Comp toggle that loudness compensates for resonance) is where the character lives. If you only learn one section of Laura deeply, this is the one.



THE FILTER TYPE DROPDOWN.

The filter types

Fourteen types ship in v1.1. I'll list them in the order they appear in the dropdown, with a short note about when I reach for each.

- **Off.** The filter is bypassed entirely. Cutoff and resonance have no effect.
- **LP24.** A four pole state variable low pass. The default for most pads and basses. Steep, clean.
- **BP.** A two pole band pass. The cutoff is the centre frequency. Useful for vocal sounding patches.
- **HP24.** A four pole high pass. Less common as a primary filter; great as a tone shaper to clean rumble before a saturator.
- **Notch.** Input minus the band pass. Removes a narrow band at the cutoff frequency. Modulated, it gives a hollow phaser effect.
- **LP12.** A two pole low pass. Less steep than LP24, more musical on bright leads.
- **HP12.** A two pole high pass. The lightest tone shaper.
- **Peak.** Resonant additive peak. Dry signal plus a Q scaled band pass. Boosts a band rather than subtracting from one. Use it for parametric EQ style colouring.
- **Comb.** Feedback comb filter tuned to the cutoff frequency. Marked experimental. Karplus-Strong style metallic resonance.
- **Formant.** Three band pass vowel filter. Cutoff sweeps the vowel from U through O, A, E, I. Marked experimental. Use sparingly; very specific character.
- **String.** Karplus-Strong string model. Comb plus damped feedback. Marked experimental. Pluck patches.
- **Ladder.** Moog style four pole ladder with tanh feedback. Marked experimental. Warmer and rounder than LP24, with a characteristic resonance bloom.
- **MorphSVF.** An SVF with the LP, BP, and HP outputs crossfaded by the Morph knob. Morph at 0 is LP, at 0.5 is BP, at 1 is HP. The continuous in between settings give shapes that aren't quite any of the three.
- **Synapse.** Laura's signature filter. See the dedicated section below.

Drive Mode and the character pack

The Drive Mode dropdown sets the saturation character for the pre filter drive stage and (on Synapse) for the resonance feedback inside the integrator. Ten modes ship. The first six are the original Lost Synapse character pack; the last four were added in v1.1 for users who wanted more familiar saturation shapes.

- **Tanh.** The cleanest of the bunch. Gentle compression and a soft rolloff. Adds weight without obvious distortion. The default.
- **Soft.** Rounded curve with more even harmonics. Warms the low mids, adds presence without grit.
- **Hard.** Edges intact, harmonics blunt. The pick when you want the filter to bite, not whisper.
- **Aurora.** Drive feeds back through the filter's previous output, so resonance grows musically with intensity. A singing peak rather than a flat clip. Bright, shimmering, extended upper harmonics. Pairs well with low resonance and a slow cutoff sweep.
- **Mirage.** Asymmetric drive with a DC cancelled bias offset. Adds even order harmonics for a warm, tube like glow distinct from any symmetric clipper. Slightly off axis: a small phase shimmer alongside the saturation, so the same cutoff sweep sounds less mechanical.
- **Halo.** Drive softens as the filter's own previous output rises (output ducked). Creates a breathing, vocal aura around the resonance peak. Round and forward.
- **Tube.** Asymmetric tanh with a DC bias for even harmonic warmth. The most "amp like" of the additions.
- **Tape.** Soft sigmoidal (x divided by $1 + \text{absolute } x$). Ductile compression that flattens transients without sharp clipping. Good for pads.
- **Diode.** Smooth hard clip with a definite knee. Sharper than Tape, less surgical than Hard.
- **Fold.** Wave folder. Sine based at half period scale. Pushes drive past the maximum and the waveform folds back. Aggressive and harmonic at low amounts, alien at high amounts.

I tuned each of these against real material (bass, leads, pads, plucks) rather than a sine sweep. Flip between them on a held note and each one should sound clearly different. They're ten separate algorithms, not one curve relabelled ten times.

Cutoff and HP Cut

Cutoff is the standard filter cutoff frequency. HP Cut is a series two pole high pass placed before the main filter, with its own corner frequency. Use it to clean rumble out of a patch before the resonance starts ringing on the low frequencies, or to carve out the low end on a sub bass channel so a hardware bass can sit underneath. It's gentle by design (two poles, not four) so you can leave it on by default without losing weight. At 20 Hz it's effectively bypassed.

Env to Cut, Keytrack, Vel to Cut

Three modulators are wired into the cutoff directly so you don't have to spend matrix slots on them.

- **Env to Cut.** The amount the filter envelope moves the cutoff, in octaves. At plus 3.5 octaves, every note opens the filter by three and a half octaves over the envelope's run. Negative values close the filter as the envelope rises.
- **Keytrack.** The amount the cutoff follows played notes. 100 percent makes the cutoff track key one to one, so a pluck stays the same character across the keyboard. Zero percent makes the filter ignore pitch.
- **Vel to Cut.** The amount velocity opens or closes the cutoff, in octaves. A small positive value gives a patch dynamics without you having to map velocity in the matrix.

— CHAPTER 8, CONTINUED

The Synapse filter

Synapse is Laura's signature filter and the one I want you to find. It sits at the bottom of the filter type dropdown, and it's the one to reach for when you want the filter to *sing* instead of just open and close.

What makes Synapse different from LP24

- **Always on warmth.** A gentle saturation sits before the filter and stays active even with the Drive knob at 1.0. The patch never sounds clinical; resonant sweeps have body from the first note.
- **Four pole slope with a detuned cascade.** Two filter stages are slightly offset in frequency so the resonance peak spreads across a narrow band instead of sitting on a single point. The result is wider, more vocal resonance.
- **Drive Mode shapes the resonance.** The Drive Mode you pick does double duty on Synapse: it colours the pre filter drive AND the integrator saturation inside the filter. Each mode gives Synapse a distinct resonance personality. Aurora and Mirage are the most vocal; Halo gives a breathing, ducked quality.
- **The filter listens to itself.** A small amount of the previous sample's output feeds back into the next sample's input. This is what gives Synapse its alive analogue quality. Plain digital filters skip this step; that's why they sound static by comparison.
- **Cutoff bloom.** Loud passages momentarily open the cutoff a touch. The effect is small but it's what you'd expect from a real analogue circuit's bias drift on high level transients.
- **Built in Sing baseline.** Synapse always has a touch of the Sing fold engaged, even with the Sing knob at zero, so the filter never sounds neutral.

None of these features are knobs. They're part of what Synapse *is*. The knobs you see on Filter+ work for Synapse exactly as they do for the other filter types; Synapse just colours their effect.

• QUICK START, THE DEMO I SHOW PEOPLE

Pick Synapse on the filter dropdown. Push Resonance to about 8. Hold a sustained chord and slowly turn Sing from 0 to 1. The resonance peak will turn from a clean ring into a vocal bloom. Try the same with each Drive Mode for ten different vocal characters. If you only ever use one filter type in Laura, I'd want it to be this one.

— CHAPTER 8, CONTINUED

The Filter+ panel

The Filter+ panel on the Voice tab is the character section. It lives full width across the bottom row of the Voice panel and hosts every Filter+ control in one place. From left to right:

Response curve display

A live drawing of the current filter shape. It tracks Cutoff, Resonance, HP Cut, the filter type, the morph knob (when the type is SVF Morph), and shows a ghost line where the filter envelope will sweep the cutoff. A small *DRIVE x[N]* badge appears in the corner when the drive stage is engaged. The display refreshes 30 times a second so quick knob movements stay legible.

A/B and Comp

- **A/B.** Snapshots the current Drive amount, then forces Drive to 1.0 (the bypass value) so you can hear what the drive stage is actually contributing. Click again to restore. Twisting Drive while A/B is active updates the snapshot and exits A/B automatically. Host automation on Drive also takes precedence.

- **Comp.** Toggles resonance compensation. When on, the filter pre attenuates by an amount tied to the current Q, so perceived loudness stays roughly flat as you push the resonance up. It applies to the SVF based types (LP24, LP12, HP24, HP12, BP, Notch, Peak, MorphSVF, Synapse). The non SVF types treat their Resonance knob as feedback or boost rather than Q, so Comp has no effect there and the button dims to flag that.

Drive Mode and FM Source dropdowns

Drive Mode sets the saturation character (covered above). FM Source picks where audio rate filter FM comes from: OSC A, OSC B, or Noise. The FM Source dropdown dims when the FM Amt knob is at zero, since the source picker has no effect without an amount.

Top row of knobs

- **Drive.** Pre filter saturation amount. At 1.0 the stage is bypassed; above 1.0 the selected Drive Mode shapes the harmonics.
- **Resonance.** Filter Q. Synapse sings most expressively from 5 to 15.
- **HP Cut.** Series high pass corner. At 20 Hz the stage is bypassed.
- **Env to Cut.** Filter envelope depth into cutoff, in octaves.
- **Keytrack.** How much higher notes raise the cutoff.
- **Vel to Cut.** Velocity to cutoff amount, in octaves.

Bottom row of knobs (character)

- **Sing.** The headline. Taps the band pass component of the filter, wave folds it, and mixes it back into the output. At low values it adds a touch of harmonic glow at the resonance frequency. At high values the resonance peak turns into a bell like, almost vocal bloom. Most expressive on Synapse but works on every SVF based type. Dims on Comb, String, Ladder, and Formant where there is no usable bandpass tap.
- **Stereo.** Splits the cutoff between left and right channels. At 100 percent the L and R cutoffs sit two octaves apart. You get instant stereo width on resonant patches.
- **Morph.** Active only when the filter type is set to MorphSVF. Crossfades between LP, BP, and HP outputs. Dims on every other type.
- **Pivot.** The note around which Keytrack pivots. Default C4 matches legacy behaviour. Set to A2 for bass patches or C6 for leads so the filter character stays consistent in the playable range. Dims when Keytrack is at zero.
- **FM Amt.** Audio rate frequency modulation of the cutoff from the FM Source. At high amounts you get classic FM bell timbres; subtle amounts add pitch shimmer.
- **Jitter.** Per voice random offset on the cutoff, frozen at note on. Each voice in a chord lands on a slightly different cutoff, creating an analogue style detune across the polyphony. Subtle, but I miss it when it's not there.

What dims and why

Filter+ uses a soft dim to signal which controls have no effect at the current settings.

- The whole card dims when the FILTER+ power icon is off.
- Drive Mode and A/B dim when Drive is at 1.0 (bypassed).
- Morph dims unless the filter type is MorphSVF.
- Pivot dims when Keytrack is at zero (there's nothing to pivot).
- FM Source dims when FM Amt is at zero.
- Sing and Comp dim on Comb, String, Ladder, and Formant.

Dimming is informational only. Dimmed controls still hold their values; they just signal "this doesn't do anything until you change a related parameter".

FX rack



THE FX RACK. MODULES IN SERIES, DRAG TO REORDER, CLICK + TO ADD.

The FX rack is a freely configurable chain of effect modules. Add a module with the **+** button at the top of the rack. Remove a module with the **x** in its header. Drag a module up or down to reorder. Each module has its own bypass button (the lit power icon in its header) so you can A/B the patch with or without any individual module.

The rack is monophonic. It sits after the voice sum: every voice goes through the same FX chain. If you want per voice processing, that lives in the synth voice (Filter+, the oscillators, Spectral Blend).

Rack mechanics

- **Add.** Click the **+** at the top of the rack. The picker shows all 15 module types. Click a name to add it. New modules append to the end of the chain.
- **Remove.** Click the **x** in a module's header. Confirmation is immediate; use Undo if you didn't mean it.
- **Reorder.** Click and drag a module up or down the rack. The slot snaps into place when you release.
- **Bypass.** Click the power icon on a module to bypass it without removing. Bypassed modules pass their input through unchanged but stay in the chain so you can re enable them.
- **Modulate FX parameters.** Every knob on every module is a matrix target. Right click a knob to add a modulation, or drag from an LFO / ENV / macro slot onto it.
- **Per module A/B.** Each module's header has a small A/B button (where applicable) that snapshots the current settings so you can hear with versus without a specific configuration.

The 15 modules

Each module gets its own page in this chapter. The order in the rack picker is roughly: Splitter, Resonance, Chorus, Delay, Reverb, Distortion, EQ, Flanger, Phaser, Freeze, Hetero, Grain, Fluxion, Compressor, Murmuration. I'll cover them in that order so the manual reads top to bottom if you scroll.

• PATCH TIP

The chain order matters more than people expect. EQ before Reverb is a tone control; EQ after Reverb shapes the tail. Distortion before Delay sounds dirty; Distortion after Delay sounds like a guitar pedalboard. Don't be afraid to drag the same modules into different orders and listen for a minute.

Splitter



THE SPLITTER MODULE.

The Splitter is a frequency band splitter. It doesn't process audio on its own; it tags bands so downstream modules can react to them. Use it when you want a different chain on the lows than on the highs. Drop a Splitter, then route the bass band through a saturator and the treble band through a chorus, and you've got per band processing without two parallel chains.

Controls

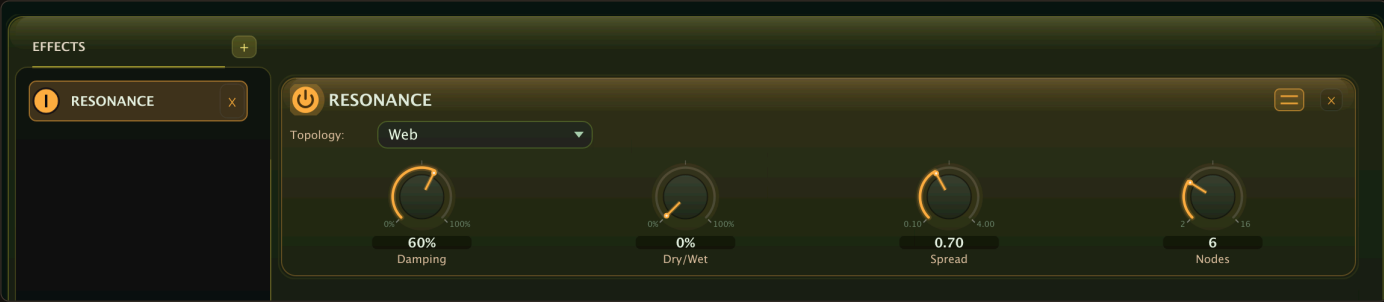
- **Mode.** Two band (Lo / Hi) or three band (Lo / Mid / Hi). Two band is the simpler workflow; three band is for when you need a dedicated mid range.
- **Crossover Hz.** The split point between Lo and Mid (or Lo and Hi in two band mode). Typical settings: 120 Hz for separating sub from body, 800 Hz for separating body from clarity.
- **Crossover Hi.** In three band mode, the split between Mid and Hi. Typical setting: 4 kHz for separating body from air.

The crossover slopes are LR4 (Linkwitz-Riley fourth order), which means the bands sum back to flat phase when no per band processing is happening. Translation: the Splitter doesn't colour anything on its own.

• PATCH TIP

For per band ducking on a heavy bass patch: Splitter (two band, crossover 200 Hz), then a Compressor on the Lo band with heavy pump from the Pump sidechain, and a Reverb on the Hi band. The low end punches; the high end stays glassy.

Resonance



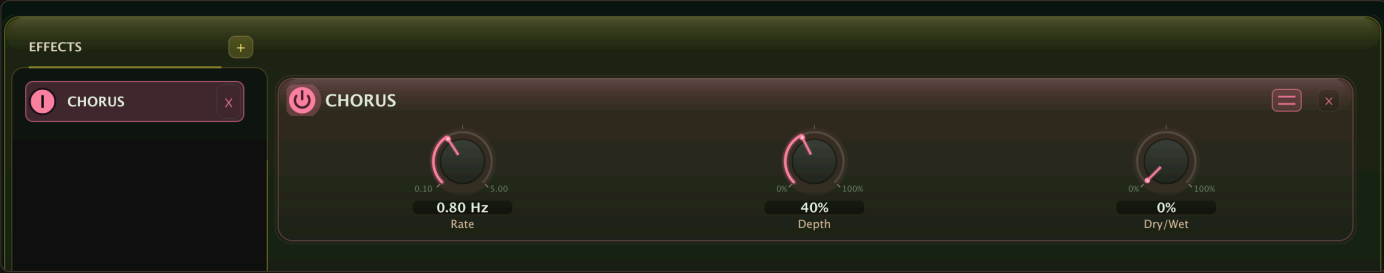
THE RESONANCE MODULE. SYMPATHETIC STRING AND FORMANT CHARACTER.

The Resonance module is a multi node resonator. It runs the incoming signal through a small network of damped feedback nodes, each tuned to a frequency. The result has a sympathetic string quality at one extreme (multiple harmonic nodes tuned to a key) and a vowel like formant quality at the other (a few inharmonic nodes spread across the vocal range).

Controls

- **Topology.** The node arrangement. Series stacks nodes in a chain; Parallel sums them; Hybrid uses both. Series is darker; Parallel is brighter; Hybrid sits between.
- **Nodes.** Number of active resonators. From 1 to 8. More nodes give a richer, more "stringy" character; fewer nodes give a clean, single resonance.
- **Damping.** How quickly each node decays. At 0 the nodes ring out almost forever, like a sympathetic string. At 1 they barely sustain. I usually sit around 0.4 to 0.6.
- **Spread.** Tuning offsets between the nodes. At 0 all nodes are at the same frequency (the input's pitch tracked). Increasing spread detunes the nodes outward, creating chorus or chord like resonance.
- **Dry/Wet.** Resonator mix into the dry signal. 100 percent is pure resonator; 50 percent is half and half.

Chorus



THE CHORUS MODULE.

A simple stereo modulated delay chorus. Adds width and movement without colouring the tone significantly. The cheapest CPU module in Laura, so it's a good thing to leave on as a finishing touch.

Controls

- **Rate.** Modulation rate in Hz. 0.3 to 0.8 Hz is the classic chorus range. Push higher for a vibrato character.
- **Depth.** How much the delay time wobbles. Subtle widening at low depth; classic detuned ensemble at high depth; underwater warble at very high depth.
- **Dry/Wet.** Wet level. 30 to 50 percent is the standard range; 100 percent gives a pitch shifted lead character.

Delay



THE DELAY MODULE.

DELAY MODES: SMEAR, TAPE, DIGITAL.

Stereo delay with three character modes, host tempo sync, and a feedback filter for taming the high end on long tails. Modulation on the delay time gives chorus and vibrato flavours at short settings, and pitched smears at longer settings with feedback.

Controls

- **Type.** Smear (granular smear style time stretching across the delay buffer), Tape (analogue saturation and wow on each repeat), Digital (clean repeats with no character). I usually start on Tape and only switch to Digital if I need surgical clarity.
- **Time.** The delay time. Visible as either milliseconds or a note division depending on the Sync state.
- **Sync.** Toggle between free time and host BPM sync.
- **Sync Rate.** When Sync is on, picks a note division (1/32 through 4 bars, plus dotted and triplet).
- **Feedback.** How much of the delayed signal feeds back into the input. Above 100 percent the delay self oscillates, which is great for ambient pad textures and dangerous for everything else.
- **Low Cut.** A high pass on the feedback path. Removes low rumble from each repeat so the bass stays defined.
- **Hi Cut.** A low pass on the feedback path. Mimics tape losing its highs with each pass.
- **Drive.** Saturation on the feedback path. Audible on Tape mode primarily; less so on Digital.
- **Mod Rate / Mod Depth.** LFO on the delay time. Subtle modulation gives chorus widening; deep modulation gives pitched smears.
- **Width.** Stereo spread between L and R taps. At 0 the delay is mono; at 1 the L and R repeats are independent.
- **Ducking.** Side chain compression of the wet signal by the dry. The delay tail ducks under the incoming notes and rises back up between them. Cleans up dense playing without losing the tail.

Reverb



THE REVERB MODULE.

REVERB TYPES.

The Reverb has two engines. The first is algorithmic, with three voicings (Vintage, Hall, Plate). The second is a convolution engine that loads short impulse responses from a small built in bank. The Type dropdown picks between them; the rest of the controls behave the same regardless of engine.

Controls

- **Type.** Vintage, Hall, Plate, or one of the convolution IRs. Vintage has a dense, warm tail. Hall is wide and long. Plate is bright and shimmery. The convolution IRs cover specific spaces, with names like Cathedral, Cabin, Tunnel.

- **Size.** Room size. On algorithmic modes this scales the tail length. On convolution mode this stretches the IR. Stretch sounds artificial above 1.5x, intentionally.
- **Damping.** High frequency damping over the tail. At 0 the reverb stays bright forever. At 1 it goes dark almost immediately.
- **Predelay.** Delay before the reverb starts, in milliseconds. Separates the dry signal from the reverb tail. Useful on vocals and leads.
- **Cut Lo.** High pass on the reverb signal. Stops the tail from muddying the low end.
- **Cut Hi.** Low pass on the reverb signal. Tames sibilance.
- **Modulation.** Slow LFO on the reverb tail. Subtle: at low amounts adds chorus to the tail; at high amounts the tail sounds detuned.
- **Shimmer.** Pitch shifts the tail up an octave and feeds it back in, so the reverb grows higher and longer over time. Use sparingly; it's expensive CPU wise.
- **Dry/Wet.** Wet level.

— CHAPTER 9, FX MODULE 6 OF 15

Distortion



A multi mode waveshaper with an optional internal filter. The shaper modes cover the common ground from soft saturation to digital bit crushing.

Controls

- **Type.** Soft (gentle tube style), Tube (asymmetric tube), Fold (wave folder), Bitcrush (sample rate and bit depth reduction). Soft and Tube are musical; Fold and Bitcrush get aggressive fast.
- **Drive.** Input gain into the shaper. Higher drive means more distortion. On Bitcrush, Drive primarily controls the bit depth.
- **Mix.** Parallel blend between dry and distorted. 100 percent is fully wet.
- **Filter routing.** Pre or Post. The internal filter sits either before or after the shaper. Pre tames input before distortion (more focused harmonics). Post shapes the output (cleaner final tone).
- **Filter type.** Low pass, band pass, or high pass.
- **Filter freq.** The filter cutoff.
- **Filter Q.** Resonance of the internal filter.

— CHAPTER 9, FX MODULE 7 OF 15

EQ



A two band parametric EQ. Not a mastering EQ. Use it for finishing tone shaping on the synth, not as your last word on the mix.

Controls (per band)

- **Shape.** Bell (peak), Low Shelf, or High Shelf. Bell boosts or cuts a band; shelves boost or cut everything above or below the corner.
- **Freq.** Centre frequency for Bell, corner for shelves.
- **Q.** Width of the band on Bell. Narrow Q is surgical; wide Q is musical. Has no effect on shelves.
- **Gain.** Boost or cut, in dB.

● PATCH TIP

For most synth tone shaping I use band 1 as a low shelf around 80 Hz to manage the low end, and band 2 as a wide Bell around 4 kHz for presence. Two bands feels limiting at first; you'll find you don't need more than that for a clean synth tone.

— CHAPTER 9, FX MODULE 8 OF 15

Flanger



THE FLANGER MODULE.

A short modulated delay with feedback. Sweeps a comb filter across the signal. Metallic at low LFO rates, jet engine at fast rates and high feedback.

Controls

- **Rate.** LFO rate in Hz.
- **Depth.** How much the delay time wobbles. Sets the width of the swept comb.
- **Feedback.** How much of the flanged signal feeds back. Higher feedback intensifies the comb resonance. Negative feedback (yes, it's negative on the knob) inverts the phase of the feedback and gives a more hollow character.
- **Phase.** Phase offset between L and R LFOs. At 0 the L and R sweeps are in phase (mono flanger). At 180 degrees they're opposite (wide stereo).
- **Mix.** Wet level.

— CHAPTER 9, FX MODULE 9 OF 15

Phaser



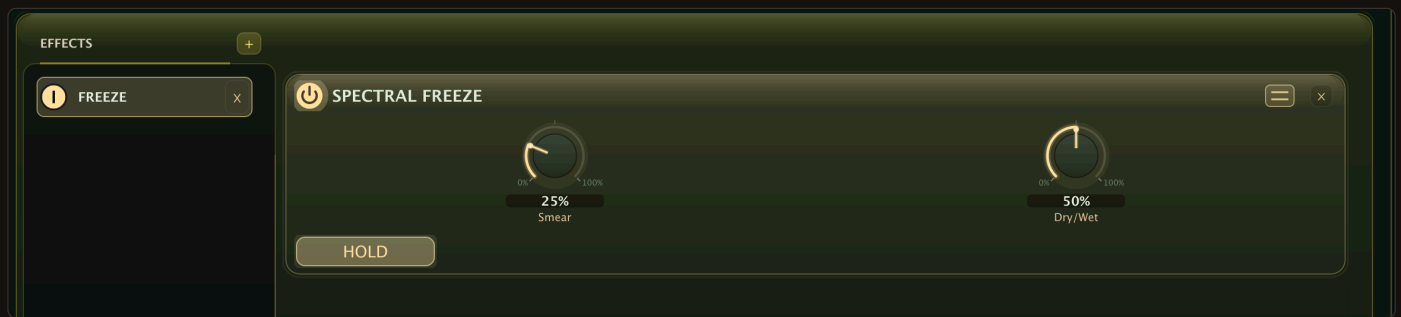
THE PHASER MODULE.

A multi stage all pass phaser with LFO modulation and feedback. Wider and more vocal than a flanger, less metallic.

Controls

- **Rate.** LFO rate in Hz.
- **Stages.** Number of all pass stages: 2, 4, 6, 8, 12. More stages mean more notches and a more complex swept tone.
- **Depth.** How wide the notches sweep across frequency.
- **Freq.** The centre frequency around which the notches sweep. Low Freq for a body phaser, high Freq for a treble phaser.
- **Feedback.** How much of the phased signal feeds back. Higher feedback intensifies the notches.
- **Phase.** L vs R LFO phase offset. 180 degrees is wide stereo.
- **Mix.** Wet level.

Freeze



THE FREEZE MODULE. SPECTRAL FREEZE AND SMEAR.

A spectral freeze. Captures a slice of the audio signal as a frozen spectrum and sustains it indefinitely. The frozen layer plays alongside the live signal so you can build evolving pads from short notes.

Controls

- **Hold.** The freeze gate. When Hold is at 0 the freeze is silent. When you push Hold up, the current spectrum is captured and held at that level for as long as Hold stays up. Lowering Hold releases the freeze.
- **Smear.** Smooths the captured spectrum over time. At 0 the freeze is a pure held spectrum. At 1 the freeze blurs across windows, giving a more pad like, less harmonic frozen layer.
- **Dry/Wet.** Mix of the freeze into the live signal.

• PATCH TIP

Modulate Hold from a slow envelope so the freeze captures a chord and releases it over several bars. The captured chord becomes a backing pad behind your live playing.

Hetero



THE HETERO MODULE. HETERODYNE FREQUENCY SHIFTING.

A heterodyne frequency shifter. Shifts every frequency component of the input by a constant amount, breaking harmonic relationships. The result is metallic, inharmonic, otherworldly. Distinct from a pitch shifter (which preserves harmonic ratios) and from a ring modulator (which uses a sine carrier instead of a Hilbert pair).

Controls

- **Shift.** The shift amount in Hz. Bipolar: negative shifts everything down, positive shifts up. Small shifts (under 10 Hz) give a slow vibrato style detune; large shifts (over 100 Hz) destroy harmonicity.
- **Feedback.** Re-shifts the already-shifted signal. Builds a cascade of inharmonic copies. Use sparingly.
- **Direction.** Up only, down only, or both. Both gives a symmetric inharmonic spread.
- **Delay.** Adds a delay between feedback passes, so the shifted copies stack rhythmically rather than spectrally.
- **Blur.** Smooths the shifted output. Less aggressive at high amounts; more "verb like".
- **Dry/Wet.** Mix.

Grain



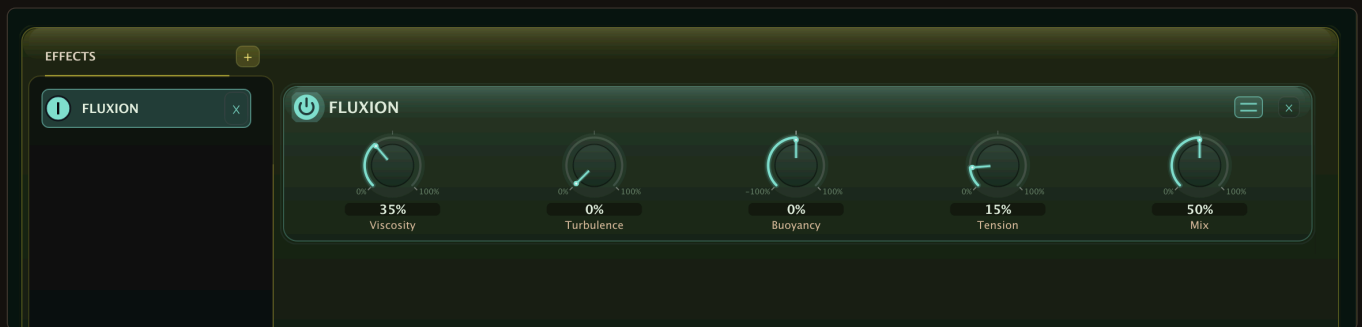
THE GRAIN MODULE. GRANULAR CLOUD.

A granular processor. Captures a rolling buffer of the input audio and resynthesises it as a cloud of short grains. Pitch jitter, position jitter, and density independent of the input timing make it suitable for textures, pad layers, and glitch effects.

Controls

- **Grain Size.** Length of each grain, in milliseconds. Small grains (10 to 30 ms) sound granular and rhythmic. Long grains (200 to 500 ms) sound like a stretched pad.
- **Density.** Number of overlapping grains per second. High density (8+ grains per second) gives a thick cloud. Low density (1 to 2 per second) gives a sparse, percussive output.
- **Pitch Jitter.** Random pitch offset per grain. At 0 grains all play at the input pitch. At 1 each grain picks a random pitch within an octave.
- **Position Jitter.** Random read position offset per grain. At 0 grains all read from the same buffer position. At 1 they're spread across the buffer.
- **Dry/Wet.** Mix.

Fluxion



THE FLUXION MODULE. TIME VARYING SPECTRAL EFFECT.

Fluxion is a hard module to summarise. It applies a slow, time varying spectral transform to the input, with controls that come from fluid dynamics terminology rather than audio terminology. The effect is evolving, fluid, and impossible to mistake for any other module in the rack. I included it because it does something nothing else in Laura does.

Controls

- **Viscosity.** How sluggishly the spectral state changes. High viscosity: changes propagate slowly, the effect feels thick and heavy. Low viscosity: rapid spectral motion.
- **Turbulence.** Spectral chaos. At 0 the transform is smooth and predictable. At high values the spectrum shimmers chaotically across bins.
- **Buoyancy.** Bias toward higher or lower frequencies. Positive buoyancy lifts the spectral content upward over time; negative pushes it down.
- **Tension.** Coupling strength between adjacent spectral bins. High tension binds the spectrum together (smooth, vocal motion); low tension lets each bin drift independently (atomised, granular).
- **Mix.** Wet level.

● WHEN TO REACH FOR FLUXION

I reach for Fluxion on ambient pads, evolving drones, and any patch where I want the texture to keep changing without an obvious LFO. It's the most expensive module in the rack other than Reverb with Shimmer, so I tend to use it on its own track rather than over an already complex chain.

Compressor



THE COMPRESSOR MODULE. CORE DYNAMICS PLUS FOUR OPTIONAL LAYERS.

The Compressor was the largest single addition in v1.1. It's a transparent compressor on the front, with four optional layers (Bloom, Drift, Pump, Spectral) that you can dial in to push it well past transparent. The four are not modes you switch between. They're independent features you can layer in any combination. Set them all to zero and you have a clean comp. Push Bloom and Drift up and you've got something that breathes. Push Pump and Spectral and you've got something that doesn't sound like a compressor at all.

Core dynamics

- **Threshold.** The level above which compression kicks in, in dB. Default minus 12.
- **Ratio.** Compression ratio, from 1:1 to 20:1. 4:1 is a starting point. Above 8:1 is limiting territory.
- **Attack.** Time from threshold cross to full gain reduction, 0.1 to 200 ms. Faster on transients, slower on tone shaping.
- **Release.** Time from threshold release back to unity, 5 to 2000 ms.
- **Knee.** Smoothness of the compression curve around the threshold, 0 to 12 dB. Soft knee blends 1:1 into the set ratio across the knee width. Prevents audible clicks at the threshold boundary.
- **Makeup.** Output gain after compression, minus 12 to plus 24 dB.
- **Auto-Makeup.** When on, makeup gain auto derives from threshold and ratio for loudness matched output, and the Makeup knob becomes additive trim. When off, Makeup is absolute.
- **Mix.** Parallel blend between dry and compressed. 100 percent is fully compressed. Lower values give parallel compression.

Detection

- **Detection Mode.** Peak or RMS. Peak responds to instantaneous level; RMS responds to average level over a 10 ms window. Peak is tighter on transients; RMS is smoother on sustained content.
- **SC HPF.** Sidechain high pass filter, 0 to 1000 Hz. Removes low frequencies from the detector so kicks and subs don't trigger compression. Classic trick for bus glue on full mixes.
- **Pre (Lookahead).** Bipolar, minus 10 to plus 5 ms. Positive: audio path delayed so the gain reduction is pre engaged before the transient arrives (gentle). Negative: detector reads past samples while audio stays undelayed (transients punch through). Constant 5 ms PDC regardless of knob value, so the plugin always reports the same delay to the host.
- **Atk Shape / Rel Shape.** Curve shape for attack and release envelopes. Minus 100 to plus 100 percent. Negative values give a fast initial response that slows down; positive values give a slow initial response that accelerates. At zero you get the standard exponential.

Bloom, Drift, Pump, Spectral, Harmonics

Bloom

A parallel resonant bandpass filter that's modulated by the *inverted* gain reduction envelope. As the main signal compresses and ducks, a swept resonant peak rises into the freed frequency space. Sounds like a psychedelic swell on top of the compressed signal. Distinct character, especially on pads and held chords.

- **Bloom Amount.** 0 to 100 percent. The mix of the bloom layer into the output.
- **Bloom Freq.** 200 to 6000 Hz. The bandpass centre frequency.
- **Bloom Q.** 0.5 to 10. Resonance of the bandpass. High Q for vocal blooms; low Q for diffuse air.

Drift

A smooth random walk that modulates threshold, attack, and release per block. Each transient compresses slightly differently, the way an analogue compressor would as its detector circuitry warms up and breathes. Subtle but unmistakable when A/B'd.

- **Drift Amount.** 0 to 100 percent. Depth of the random walk.
- **Drift Rate.** 0.05 to 5 Hz. Speed of the random walk. Low rates feel like long term drift; high rates feel like nervousness.

Pump (Auto-Pump)

An internal LFO sidechain. The Compressor pumps the entire output once per LFO cycle, with the recovery shape following the Release knob. Mimics the classic side chained kick duck on house and techno without needing an actual kick.

- **Pump Amount.** 0 to 100 percent. Depth of the pump.
- **Pump Rate.** 0.05 to 20 Hz, or a tempo synced division.
- **Pump Rate Mode.** Hz or any of 1/32 through 4 bars. Pick a division and the pump locks to host BPM.

Spectral

Splits the input into frequency bands and compresses each band independently. Bloom is skipped in spectral mode (the bandpass would double up).

- **Spectral Mode.** Off, 2-Band (Lo / Hi), or 3-Band (Lo / Mid / Hi).
- **Spec Lo Crossover.** 40 to 2000 Hz. The split between Lo and Mid (or Lo and Hi in 2-band).
- **Spec Hi Crossover.** 500 to 18000 Hz. In 3-band only, the split between Mid and Hi.

The crossovers are LR4, so when no per band processing happens, the bands sum back flat. Each band runs its own detector, gain reduction, and VCA.

Harmonics

A post VCA tanh saturation whose drive scales with current gain reduction. Adds colour and warmth that intensifies as compression deepens. At 0 percent the saturation is bypassed; at 100 percent it's audible even at light compression.

Scope and ballistics preview

The card has two visualisers. The big **Scope** shows a 4 second scrolling history of gain reduction, scaled 0 to minus 60 dB. The threshold line wobbles in real time when Drift is active. The GR fill brightens toward white as Bloom level rises. Badges flag PRE lookahead, SPEC 2-BAND or 3-BAND when active. Below that, a tiny **BallisticsPreview** draws a synthetic step response so you can see attack, release, and shape interaction without needing audio.

• QUICK RECIPES

Transparent glue. Threshold minus 10, Ratio 2:1, Attack 30 ms, Release 100 ms, Knee 6, Auto-Makeup on. All four layers at zero. Drop on a bus.

Side chain pump. Threshold minus 6, Ratio 4:1, Attack 5 ms, Release 200 ms. Pump Amount 50 percent, Pump Rate 1/4 synced. Mix at 80 percent.

Multiband shaping. Spectral Mode 3-Band, Lo crossover 250, Hi crossover 2500. Threshold minus 12, Ratio 3:1. Adjusts each band independently because each has its own detector.

Psychedelic bloom. Threshold minus 18, Ratio 6:1, Bloom Amount 60 percent, Bloom Freq 1200 Hz, Bloom Q 3. Hold a chord and you'll hear what I mean.

Murmuration



THE MURMURATION MODULE. A FLOCK OF ECHO TAPS THAT SCATTERS ON A TRANSIENT AND SETTLES INTO A SWARM.

Murmuration is a multitap delay built on a flock of starlings. A group of birds drifts through a field, and each bird is one echo. Where a bird sits left to right is its delay time, where it sits up and down is its pan, and how tightly it's packed with its neighbours is how loud it is. The flock follows the rules a real flock does, pulling toward the group, keeping a little distance, falling in with the birds nearby, and it circles a roost point you place on the delay.

The part worth having is what the flock does when you play. A note with an attack scares it and it scatters, then it wheels back together and settles. So a pluck or a stab bursts open into a cloud of echoes that fan out and regroup, and because the flock is never in quite the same place, the cloud never repeats the same way.

The rhythm of the echoes comes from the flock, not from a grid. I built it because I wanted echoes that move with what you play instead of repeating the note back at you.

Controls

- **Flock.** How many birds are in the air, which is how many echoes you hear. Low settings give a handful of distinct taps; high settings fill the field with a dense swarm.
- **Cohesion.** How strongly the birds pull toward each other. High cohesion keeps the flock tight so the echoes cluster close in time. Low cohesion lets them wander.
- **Separation.** How hard the birds avoid crowding. Raise it and they spread out across the delay range; lower it and they pack in near the roost.
- **Spook.** How easily an incoming transient scatters the flock. At low settings only a sharp hit sets them off; at high settings almost any attack does. This is the knob that ties the motion to your playing.
- **Roost.** The centre delay the flock circles, from a few milliseconds up to three quarters of a second. Short roosts give a slapback cloud; long roosts give spaced echoes.
- **Spread.** How far the birds range either side of the roost. Narrow spread keeps the echoes near the centre delay and pitched; wide spread fans them across a long window, which thins the pitch into a wash.
- **Feedback.** How much of the swarm feeds back in. Higher values let the cloud sustain and build instead of dying after one pass.
- **Dry/Wet.** Blend between the dry signal and the swarm. Around half keeps the note in front with the flock behind it; all the way up hands the sound over to the cloud.

• WHEN TO REACH FOR MURMURATION

It's at its best on anything with attacks: plucks, keys, percussive leads, a stab you want to set in motion. Turn Spook up and every note scatters the flock so the echoes never land the same way twice. On held chords and pads it settles into a slow swarm instead, which is its own texture if you keep Spread narrow so the pitch holds. Start with Dry/Wet around half so the dry note anchors the sound while the flock works behind it.

Sequencer



GEOMETRIC MODE.



GALAXY MODE.



CONSTELLATION MODE.

The sequencer is the part of Laura I rebuilt most completely in v1.1.0. In v1.0 it was a step sequencer with steps placed along a parametric 2D shape. I added three modes, eight redesign features, per-step modulation lanes, fractal subdivisions, conditional triggers, and feel presets. This chapter covers all of it.

The four modes

The Mode dropdown at the top of the sequencer picks one of four behaviours. The canvas underneath changes accordingly, and only one mode runs at a time.

- **Geometric.** The classic mode. A single playhead walks the shape, hitting the placed step nodes in order. Direction, scale, key, and the shape itself control what notes you get. This is the mode the v1.0 manual described.
- **Galaxy.** Bouncing balls. Multiple "balls" move freely inside the shape's bounding region. When a ball crosses a node, the node fires. Density, speed, and damping are physics parameters rather than musical ones, and the result is rhythmically loose, evolving sequences that work great as drones, generative pads, or ambient layers.
- **Constellation.** Orbital attractors. Balls orbit gravitational nodes placed inside the shape. The orbits couple, the system reshapes itself, and the firing pattern emerges from the physics. The most experimental of the three physics modes, and the one most likely to produce sequences you wouldn't have programmed.
- **Arp.** The arpeggiator. Instead of firing fixed nodes, it takes the keys you hold and plays them back as a tempo-synced pattern. Picking it swaps the panel to the arp controls. Covered on its own page at the end of this chapter.

Shapes and scales

Shapes

The Shape dropdown picks the parametric curve that step nodes are placed along. Each shape responds differently to *Points*, *Rotation*, and *Scale*, so a 7 point Rose is a different sequence from an 11 point Rose. Nine shapes ship in v1.1.

- **Spiral.** An Archimedean spiral. Points fan outward from the centre. Rotation rotates the whole spiral; Scale changes the tightness of the windings.
- **Polygon.** A regular polygon. Points are the vertices. Six points gives a hexagon, eight gives an octagon, and so on.
- **Lissajous.** A Lissajous curve. Two superimposed sine motions in x and y. Different point counts give different ratios and different curves.
- **Rose.** A rose curve (rhodonea). Multi petal flower shape. Point count picks the petal count.
- **Star.** A regular star polygon. Concave star, distinct from Polygon.
- **Hypocycloid.** A hypocycloid. The curve traced by a point on a small circle rolling inside a larger one. Astroids, deltoids, and the like.
- **Butterfly.** The butterfly curve, an elegant transcendental curve I included because I liked how it sounded.
- **Sacred Geometry.** A flower of life style arrangement of intersecting circles. The most musical of the shapes on average; lots of points clustered with internal symmetries.

- **Custom.** Freehand. When Custom is selected, the canvas exposes a Draw toggle. Drawing in the canvas places a path that becomes the shape. Strokes snap to the canvas's internal coordinate system. See *Shape as canvas* below.

Key and scale

Step pitches are quantised into the selected scale, starting from the selected key. The Key dropdown covers all twelve pitch classes (C through B). The Scale dropdown covers twelve modes:

- Major, Minor, Pentatonic, MinorPentatonic, Blues, Dorian, Phrygian, Mixolydian, Lydian, HarmonicMinor, WholeTone, Chromatic.

Change either Key or Scale and the entire sequence re-quantises immediately. The shape stays the same; only the pitch quantisation changes.

Direction

How the playhead walks the placed nodes (in Geometric mode).

- **Forward.** Nodes in placed order, looping at the end.
- **Reverse.** Backwards.
- **PingPong.** Forward, then reverse, then forward.
- **RandomWalk.** Each step picks a neighbouring node at random.

Rate, Speed, Probability, Swing

- **Rate.** Step rate, either free or tempo synced (1/4, 1/8, dotted, triplet).
- **Speed.** Tempo multiplier. Useful for doubling or halving without changing the synced division.
- **Probability.** Global step probability. At 100 percent every step fires; at 50 percent each step has a coin flip.
- **Swing.** Off beat step shift. 50 percent is straight; above 50 swings the off beats later for a shuffled feel.

— CHAPTER 10, CONTINUED

The eight redesign features

These are the features I added in v1.1.0 to take the sequencer from "shape based step sequencer" to something I don't know of any other plugin that does. Each gets its own section.

1. Mod lanes

Every step now has two extra value channels, Mod A and Mod B. Each step writes its current Mod A and Mod B values at fire time, and those values are exposed as matrix sources (*Seq Mod A*, *Seq Mod B*). The lane editor sits below the step row.

The lanes have a global Target dropdown at the top, which is the default destination if no per node override is set. The full target list is the same as the main matrix target list, with one important caveat for v1.1.0.

• A NOTE ON PER STEP SMOOTHING

Most mod lane targets sound clean even on dense patterns. Pan got a dedicated per sample smoother in v1.1.0 specifically so step rate Pan modulation rides through without clicking. A few targets still take the lane value directly into a sensitive stage: Volume, Filter Drive into heavy saturation, Filter Resonance at very high Q, and big Cutoff sweeps at high Q. On extreme settings you may hear a faint step rate texture there. Wavetable Position, Pan, and Filter Cutoff at moderate Q are the safest picks if you want a fully glassy ride.

2. Conditional triggers

Each step has a TriggerCondition. The step only fires if the condition is true. Combined with global FILL toggles, this is how you get tracks that vary every bar without having to draw out the whole pattern.

- **Always.** Fires every time. Default.
- **1:2, 2:2.** Fires once in every two cycles. 1:2 fires on the first; 2:2 fires on the second.
- **1:3, 2:3, 3:3.** Same pattern for three cycles.
- **1:4, 2:4, 3:4, 4:4.** Same for four.
- **1:8.** Fires once every eight cycles.
- **Fill.** Fires only when the global FILL toggle is on. Use for fills that you trigger from a controller.
- **NotFill.** Fires only when FILL is off. Use for the main pattern; combined with Fill conditions on other steps, FILL replaces a beat.
- **First.** Fires only on cycle 0 (the first time through after reset). Use for intros.
- **NotFirst.** Fires on every cycle except the first.
- **Pre.** Fires only if the previous step fired. Use for echoes and call/response.
- **NotPre.** Fires only if the previous step didn't fire.

3. Feel presets

Pre tuned humanisations of the whole sequence. One click apply. Each feel reshapes velocity, gate, probability, ratchet, slide, chord, micro timing, modA, modB, and trigCondition. The pitch sequence stays untouched.

- **Acid.** Slidey, syncopated, tight gates, slight micro timing shuffle. Roland 303 style.
- **Dub.** Long gates, low probability on off beats, very loose micro timing. Spacious.
- **Techno.** Straight, full velocity, tight gates, conditional FILL on every fourth step. Driving.
- **Ambient.** Long gates, low velocity, sparse probability, no swing. Generative.
- **Breakbeat.** Heavy swing, varied gates, ratchets on accents. Broken.
- **Drone.** All steps fire, no rhythm, long gates, soft envelopes. A held cloud.
- **Glitch.** Random gates, random ratchets, conditional triggers everywhere. Chaotic but coherent.
- **Trance.** Eighth note arpeggios, full velocity, slight build over cycles via probability ramps.

— CHAPTER 10, CONTINUED

The eight features, continued

4. Fractal nodes

Each step can have up to 8 sub steps (a fractal subdivision). When a fractal step fires, it plays its sub sequence in the time of one normal step. The sub steps have their own pitch offsets and velocity scales.

Right click a step and pick a FractalPreset to fill the sub steps with a one click template.

- **Roll2 / Roll4 / Roll8.** Repeats of the step's pitch, evenly subdivided. The classic ratchet.
- **OctaveUp.** Step pitch followed by the same pitch an octave up.
- **FifthWalk.** Step, fifth, octave, fifth. A walking arpeggio.
- **ScaleWalk4.** Four ascending scale steps starting from the step's pitch.
- **ChordStab.** Two voiced chord notes simultaneously.
- **SlideTail.** Pitch slide upward across the sub steps. Tail effect on long steps.
- **SnareGhost.** Low velocity ghost notes around a louder hit. Drum style.

5. Brush edit

Drag horizontally across the lanes view to paint values across multiple steps at once. The drag interpolates the Y position linearly between drag start and drag end, so you can paint a ramp by dragging from low to high across a span of steps. Works on velocity, gate, probability, modA, and modB lanes. The interpolation is the same one Ableton Live uses for envelope automation, which is to say: it does the obvious thing.

6. Shape as canvas

When the Shape dropdown is set to Custom, the canvas exposes a *Draw* toggle. With Draw armed, you draw a path freehand and it becomes the shape. Step nodes are then distributed along the path. Each new stroke replaces the previous path; there's no layering. Strokes snap to the canvas's internal coordinate system (centred at the origin, scaled to plus/minus 1).

The point of shape as canvas is that some melodies want a curve that doesn't correspond to a parametric shape. Draw a question mark; you get a question mark sequence.

7. Tension macro

A single knob, 0 to 1, that scales the intensity of the whole sequence at once. Below 0.5 it shrinks probabilities toward zero, scales velocities down, dims mod lane depths, mutes ratchets and slides. Above 0.5 it pushes everything back up and slightly past full. At 0.5 it's neutral.

Use Tension on automation to make a sequence breathe in and out across a song section without touching individual step parameters. Map it to a macro and use it as your "intensity" performance control.

8. Per node lane targets

Each step has two per node override fields for the Mod A and Mod B targets. When set to "use lane default" (0), the step's lane values land on the lane's global Target dropdown. When set to a specific target, the step overrides the lane default for that step only.

This lets you do things like: step 1 mod lane targets Filter Cutoff, step 2 mod lane targets Resonance, on the same lane. Combined with conditional triggers, you can program a sequence where the destinations themselves move from step to step.

Slots, evolve, randomize, drag out MIDI

Pattern slots

Four named pattern slots (A, B, C, D) live under the sequencer header. Each holds an independent full sequence. Click a slot to make it active. The currently active slot is what the sequencer plays.

The **Pattern Morph** knob crossfades between two adjacent slots. Continuous parameters (position, gate, velocity, probability) interpolate smoothly across the morph. Discrete parameters (note, chord, ratchet count, trigger condition, fractal preset) hard snap at 0.5 to avoid mid step glitches.

The **Store Slot** button writes the current pattern state to the active slot. Without a store, edits live only in the active slot; they're not duplicated.

Evolve and Randomize

- **EVOLVE.** Nudges each parameter of the current pattern by a small random amount per cycle. Velocity drifts; gate lengths shift; probabilities wander. Run EVOLVE for a few bars and the pattern slowly transforms without ever fully resetting. Press EVOLVE again to stop.
- **RANDOMIZE.** Rolls a fresh pattern from scratch. Affects pitch, gate, velocity, probability, ratchet, and the placement of nodes along the shape. Doesn't touch the global key, scale, direction, or rate. Roll until you find something interesting, then tweak.

Drag out MIDI

You can drop the current sequence into your DAW as a MIDI clip. Hold `Cmd` (or `Ctrl` on Windows) and drag from the bottom right corner hot zone of the shape visualiser into your DAW's arrangement view. Laura writes the current sequence as a temporary MIDI file and hands it to the DAW. The MIDI carries pitch, velocity, gate length, and timing including any swing or feel preset humanisation that's currently active.

Useful when you want to layer the same melody on a hardware synth, or just want to lock in a pattern that you don't want to risk evolving accidentally.

Sequencer outputs as mod sources

Even when the sequencer isn't driving Laura's own voice, it's a live source. The matrix exposes:

- **Seq X / Seq Y.** The current playhead position on the shape canvas, normalised to minus 1 to plus 1.
- **Seq Radius / Seq Angle.** The same position in polar coordinates. Radius from 0 (centre) to 1 (edge). Angle from 0 to 1 (one full rotation).
- **Seq Velocity.** The current step's velocity.
- **Seq Mod A / Seq Mod B.** The current step's two mod lane values.

You can use these whether or not the sequencer is the patch's note source. Some of my favourite patches use the sequencer purely as a slow modulator, with notes coming from a DAW track.

Arpeggiator



The sequencer in Arp mode, showing the Mode, Rate, Octave, Ratchet, and Drift selectors, the Gate, Swing, Vel, and Depth knobs, and the live note trail below.

ARP MODE. THE TRAIL BELOW SHOWS EACH NOTE SCROLLING PAST AS IT PLAYS.

Pick *Arp* from the Mode dropdown and the panel swaps to the arpeggiator. Instead of firing fixed nodes, it takes the keys you're holding and plays them back as a tempo-synced pattern. It's a separate engine from the step and physics modes, so only one runs at a time; choosing Arp turns the sequencer's power on so it plays right away. The trail across the bottom shows each note as it fires, scrolling left and fading, so you can watch the pattern move (and watch the Drift order wander).

Controls

- **Mode.** The note order. Up, Down, Up-Down, Down-Up, As Played (the order you pressed the keys), Random, Chord (all held notes at once), and Drift (below).
- **Rate.** Step speed. The synced divisions (1/1 through 1/16T) lock to host tempo; Free runs at its own rate, set by a Hz knob that appears when Free is selected.
- **Oct.** Octave range, 1 to 4. The pattern repeats across this many octaves above the notes you hold.
- **Ratchet.** Off, x2, x3, or x4. Repeats each step that many times in its slot for a roll.
- **Gate.** Note length as a fraction of the step. Short for staccato, long to let notes run into each other.
- **Swing.** Delays every other step to shuffle the rhythm.
- **Vel.** A fixed velocity for every step. At 0 the arp uses the velocity you actually played each held note with.
- **Latch.** Holds the pattern after you let go of the keys. Press a fresh chord to replace it.

Drift

Drift is the order I built this for. Instead of a fixed up or down, the next note is a weighted random walk through the notes you're holding, steered by a source you choose: an LFO, a macro, or the Mycelium field. The *Drift* dropdown picks the source and the *Depth* knob sets how far it can leap. Turn the bias low and the walk

hovers around the low notes in small steps; turn it up and it jumps across the whole chord. It keeps moving and never quite repeats, so a held chord becomes a line that evolves on its own.

- A NOTE ON MPE AND VOICE MODES

The arp plays a single stream of notes, so per-note MPE expression isn't carried through while it's running; the master wheel still works, the same as in the mono voice modes. In Mono or Legato voice mode you get a clean mono arp, with Legato gliding between steps.

Preset Manager



THE PRESET MANAGER OVERLAY. CATEGORIES LEFT, SEARCH AND TAGS TOP, SCROLLABLE LIST RIGHT.

The Preset Manager is the big browser overlay you open by clicking the preset name in the header. It replaced the v1.0 popup menu in v1.1, because I'd built up enough factory presets that scrolling a single menu was painful. The new one has search, tag filters, and category sidebar.

Layout

Three zones in the overlay:

- **Left sidebar.** Category and favourites selector. Each row shows the category name and a live count of presets in it. Click a category to filter the main list. Favourites sits at the top.
- **Top bar.** Search field plus a row of tag chips. Type in the search to substring match preset names, categories, or tags. Click a tag chip to AND filter the list to presets that have that tag. Multiple tag chips combine with AND. Multiple chips plus typed search combine.
- **Main list.** Scrollable list of preset rows. Each row has a heart (favourite toggle), the preset name, a row of tag chips, and the category label on the right. Click a row to load. Right click for the tag toggle menu.

The eleven categories

Every preset belongs to one category. The categories are:

- **INIT.** Default starting points for new patches.
- **BASS.** Anything in the bass register, from sub bass to acid lines.
- **LEAD.** Mono and poly leads.
- **PAD.** Sustained, often slow attack patches.
- **KEYS.** Piano, electric piano, organ style sounds.
- **PLUCK.** Short, percussive pitched patches.
- **808.** Sub heavy, hip hop style booms.
- **DRONE.** Slow, evolving, often sequencer driven.
- **SEQ.** Patches built around the sequencer.
- **CINEMATIC.** Score style, often modulated, often atmospheric.
- **FX.** Risers, impacts, transitions, noise textures.

Tags, search, save, favourites

The 14 tag vocabulary

Tags describe character independent of category. A pad and a lead can both be "lush" or "metallic". The vocabulary is fixed at fourteen so the chip row stays compact.

- **acid, ambient, aggressive, bright, dark, evolving, glitchy, gritty, lush, mellow, metallic, rhythmic, vintage, warm.**

Factory presets auto infer tags from their name and category at first load. You can override or add tags on any preset (factory or user) by right clicking the row in the list and toggling tags in the popup. The override persists per preset. Factory presets keep their inferred tags as a fallback if you clear the override.

Search behaviour

The search field does substring matching, case insensitive, against:

- Preset name.

- Category name.
- Tag content.

Search and tag chip filters combine with AND. If you type "warm" and click the "metallic" chip, you get presets that match warm in name/category/tag AND have metallic in their tag set.

Saving a preset

Click *Save* in the header. The Save dialog opens with three fields:

- **Name.** The preset name. Make it descriptive; you'll thank yourself later.
- **Category.** Pick from the eleven category list.
- **Tags.** Toggle any of the 14 tag chips to apply tags. As many as you like.

Press Save to write the file. Cancel discards.

• FACTORY NAME PROTECTION

v1.1 refuses to save your preset if its name collides with a factory preset (case insensitive). I added this after a user accidentally overwrote their fresh patch by reusing a factory name and getting confused when the file appeared to vanish. If you hit the refusal, rename your preset to anything that isn't already a factory name and try again.

Favourites

Click the heart icon on any preset row to favourite it. Hearted presets show up under the *Favorites* entry in the left sidebar. The list is stored as a plain text file at `~/Library/Lost Synapse/Laura/favorites.txt` on macOS (or the equivalent `%APPDATA%` path on Windows). One name per line. Edit the file by hand if you want to bulk add or remove favourites; it'll load on next plugin open.

Open presets folder

The folder icon in the header opens the user presets folder in Finder (macOS) or Explorer (Windows). Useful when you want to copy presets to email, drop in new ones from a friend, or back the folder up.

Where things live on disk

- **macOS.** `~/Library/Lost Synapse/Laura/Presets/`
- **Windows.** `%APPDATA%\Lost Synapse\Laura\Presets\`

Files are XML. Drop one in the folder, restart Laura (or refresh the browser), and it appears in the list.

DICE

The **DICE** button at the top of the synth rolls a complete patch in one click. It's the fastest way to find a sound you wouldn't have programmed.

What DICE rolls

- Oscillator engines and types for both slots.
- Fractal coordinates when an oscillator is on Fractal.
- Wavetable selection when an oscillator is on Wavetable.
- Filter type and the full Filter+ knob set.
- Envelopes (ADSR shapes for both ENV slots).
- LFO rates, shapes, depths.
- Modulation matrix routings.
- An FX rack chain selected to fit the rolled timbre.
- Macro assignments where appropriate.

What DICE doesn't touch

- Master volume, so DICE never blows your ears out.
- The sequencer state. If you've got a sequence going, it keeps playing through the rolled patch.
- The preset name. DICE patches are unnamed until you Save them.
- Your favourites and tags.

Why DICE doesn't suck

DICE isn't pure random. I've taught the roller which combinations tend to sound musical, so it biases toward those. A fractal oscillator is more likely to land on a reverb and a chorus than on a bit crusher. A pluck patch is more likely to get a short release than a five second tail. Roll repeatedly and you'll notice the patches sound programmed, even though they're not.

How I actually use it

I roll until I find something interesting, then I keep almost everything the roll picked and tweak two or three knobs. The roll is a starting point. You finish it. About one in ten rolls produces something I save.

● PATCH TIP

If you keep rolling and nothing inspires you, change the category context (load any preset in a category you like, then roll). The roller biases its choices toward the category of the current patch, so rolling from a BASS preset lands on bassy results; rolling from a PAD preset lands on pads.

The cog menu



THE COG MENU, OPENED FROM THE GEAR BUTTON AT THE BOTTOM OF THE NAV RAIL.

The cog button sits at the bottom of the nav rail. Click it and you get a small popup with everything that's plugin wide rather than patch wide.

What's in the menu

- **License banner.** A section header at the top of the menu showing either *Licensed to: your.email@domain.com* or *Unlicensed (demo mode)*. The email is your activation email. I put it here for two reasons: so you can confirm at a glance which licence is active on a machine, and so that anyone leaking a licence file sees their own email staring back at them in every screenshot.
- **Boot to Init** (standalone only). When checked, the Laura standalone wrapper boots from a default patch instead of the last session state. Useful if you're using the standalone to demo or teach and you want a clean window every time. Has no effect on the AU or VST3, where the host owns state persistence.
- **MOD VIEW (Cmd+M)**. Toggles the global modulation view, which lights up every parameter with active modulation routings. Same as pressing Cmd+M anywhere in the synth. I added it to this menu so people who don't read keyboard shortcuts still discover it.
- **Reduce motion**. When checked, every animation in the interface snaps straight to its end state instead of springing into place. Good if you find the motion distracting, or you're on a machine where it stutters. It's a per machine setting and sticks between sessions.
- **Theme submenu**. Four themes ship in v1.1. The current theme has a tick next to it.

The four themes

- **Cosmic Wave**. Cyan, magenta, and green accents over a deep navy. The original look from v1.0.
- **Neon Dream**. Hot pinks and electric blues. Vivid, almost arcade.
- **Acid Sunset**. Warm orange and amber accents over near black. The current default in v1.1. The colour palette this manual is rendered in.
- **Wubba Lubba**. Green and yellow accents. Loud, fun, very 90s.

Themes are a per machine preference, not per patch. Switching themes changes the colour of every accent, every knob highlight, and the background shader. The synth's behaviour is identical regardless of theme.

Activation and licensing

How the license works

Your `.lic` file is a signed text file containing your email, your order ID, and the date the licence was issued. Laura verifies the signature against an RSA public key embedded in the plugin binary. No network is needed for activation. Laura never sends your email anywhere.

Where the license lives

- **macOS.** `~/Library/Lost Synapse/Laura/license.lic`
- **Windows.** `%APPDATA%\Lost Synapse\Laura\license.lic`

Re installing the plugin doesn't wipe this file. Deleting it deactivates the plugin and Laura falls back to demo mode until you re activate.

Multiple machines

The current license is portable. Install Laura on as many of your own machines as you need (studio desktop, laptop, backup machine) and drop the same `.lic` file onto each. I trust you not to share it.

I keep this policy because every other policy I've seen (machine fingerprinting, dongles, online activation) creates more support load than it prevents abuse, and the worst experience is a paying customer locked out of their own plugin during a session. If trust based licensing ever stops working for me, I'll switch. For now it does work.

Revocation

If a license file shows up shared publicly (in a forum post, a torrent, a chat room), I add that order ID to a revocation list. Laura consults the list at launch (and caches it locally for offline use). A revoked license falls back to demo mode.

Refunds also trigger automatic revocation, because keeping a refunded license active would let people buy, refund, and keep the plugin.

The watermark in the cog menu (your email displayed on every settings click) is the reason: every screenshot of a leaked plugin window contains the leaker's email. I haven't had to revoke anyone in v1.1's life so far.

Demo mode behaviour

Without a license, Laura runs fully but mutes its audio output for a short stretch every minute or so. The mute is deliberate and audible. Every other feature works in demo: saving presets, sequencing, FX, MSEG editing, everything. Activated presets and demo presets are interchangeable on disk.

Troubleshooting

Laura doesn't show up in my DAW

Most DAWs cache their plugin list. After installing, force a rescan in your DAW's preferences (search for "Rescan" or "Refresh plugin list"). On Logic, the AU validation can be slow on first scan, so give it a minute and check the validation log if it appears to hang.

On Windows, double check that `Laura.vst3` made it into `C:\Program Files\Common Files\VST3` (or wherever your DAW's VST3 path points). The installer script needs admin rights to write there.

"App can't be opened because Apple cannot check it for malicious software"

This message comes up on macOS for any binary that isn't notarised. v1.1 of Laura is code signed and notarised, so you shouldn't see it on a current install. If you do, you're probably opening an older v1.0 build. Update to the latest version. Your license includes free updates for life, so you already paid for it.

If you're stuck on an older build and need to open it: right click the plugin file, choose *Open*, and accept the warning. macOS will remember the choice for that file.

License rejected on launch

Two common causes:

- The `.lic` file was modified in transit (some email clients reformat plain text attachments). Re download from your order email, or copy and paste the file contents into the activation overlay manually.
- The license was revoked (refund or shared license). Email `support@lostsynapse.store` with your order ID and I'll look into it.

Audio drops every minute or so

That's intentional. The demo mode mutes audio briefly on a periodic schedule. Activating with a real license removes the mute.

High CPU on dense polyphony

Three things to try, in order of payoff:

- Lower the unison voice count on the OSC slots. Each unison voice is a full oscillator, so going from 4 to 2 cuts the oscillator cost roughly in half.
- Bypass Spectral Blend (set its Mix knob to 0). The FFT in Spectral Blend is the heaviest single feature in Laura.
- Reduce the FX chain length, particularly Reverb with Shimmer enabled and the Fluxion module, which are the most expensive in the rack.

If CPU is still high after those, increase your DAW's buffer size. Laura uses whatever buffer your DAW provides.

Patches load with the wrong wavetable

When you saved the patch, you didn't EMBED the wavetable, so the patch stores a pointer to the table file in your library. On a machine that doesn't have that file, the patch loads with a fallback (usually a sine seed) on the affected oscillator slot.

Fix: on the original machine, open the wavetable editor for that slot, click EMBED, then re save the patch. The table is now part of the preset file and travels with it.

Audio glitches that look like waveform discontinuities

If you can take a screenshot of the glitch in your DAW's waveform view, please email it. The shape of an audio glitch usually points at the cause faster than describing it in words. Email `support@lostsynapse.store`.

Keyboard shortcuts

Global

Cmd+M / Ctrl+M	Toggle MOD VIEW (highlight all modulated parameters).
Cmd+Z / Ctrl+Z	Undo a parameter change.
Shift+Cmd+Z / Shift+Ctrl+Z	Redo.

Knobs and sliders

Cmd +drag knob	Fine adjustment.
Alt +click knob	Reset to default value.
Double click knob	Enter a numeric value directly.
Right click knob	Open modulation menu, MIDI Learn, or copy/paste value.

While you drag a knob or slider, Laura shows its current value in a small bubble next to the cursor, so you can land on an exact number without opening the numeric entry. The bubble fades out a moment after you let go.

On screen keyboard

A through L	White keys, one octave starting from the current root.
W , E , T , Y , U	Black keys (sharps).
Z / X	Shift the keyboard one octave down / up.

Wavetable editor

← / →	Step backward / forward through frames.
Shift +click frame thumbnail	Set a RANGE anchor.
Cmd+Z / Ctrl+Z	Undo last edit (formula evaluation, operator pass, draw stroke).

MSEG editor

Double click empty space	Add a point at the cursor.
Double click / right click a point	Delete the point.
Drag a segment midpoint dot	Bend the segment tension up / down.
Right click empty space	Open the template gallery (Reset, Saw Up, Saw Down, Triangle, Square, Staircase, Random, Exp Up, Exp Down).
Cmd+Z / Ctrl+Z	Undo last edit (per slot undo stack).

Sequencer

Cmd +drag from bottom right of visualiser	Export sequence as a MIDI clip into your DAW.
Right click a step	Open the step's context menu (fractal preset, trigger condition, lane target override).
Drag horizontally across lanes	Brush edit. Paints values across multiple steps.

Mycelium

Mycelium is the first part of Laura where the voices in a chord affect each other. Every other modulator is private. An envelope belongs to its note, an LFO runs per voice. Mycelium is one shared thing sitting behind the whole synth, and the notes feed it together and read from it together.

Under the hood it's a small chemistry simulation, a reaction-diffusion field, the Gray-Scott model if you want to read up on it. Picture a 64 by 64 grid. Every note you play drops a splat of "chemical" into it at a spot set by pitch (left to right) and how hard you played (bottom to top). The splat spreads, reacts, and grows the slow creeping patterns that model is known for. Each voice then reads the field at its own spot and turns what it finds into four modulation sources. Because one note's chemistry spreads across the grid into the spot where another note is reading, the notes start to colour each other, and you never routed anything between them. How you voice the chord sets how strong that coupling is. Close intervals sit near each other in the field and bleed together. Wide intervals stay apart.

Mycelium lives on the MOD panel, sharing the top right card with ENV 3. Two tabs at the top of that card switch between the two. The MYC tab shows the field as a live picture with a marker on each playing voice, so you can see exactly where it's reading.



THE MYCELIUM CARD ON THE MOD PANEL. THE FIELD IS THE LIVE CHEMISTRY THE VOICES READ; FEED AND KILL SET THE PATTERN, SPAN SETS HOW TIGHTLY NOTES COUPLE.

Switching it on

ON enables the field. While it's off the four Myc sources read zero, so a patch with no Mycelium routing sounds exactly as it did before. CALM clears the field back to flat without touching the rest of the synth, for when a long held chord has filled it up and you want to start the texture over.

The controls

- **Feed and Kill.** The two numbers that set the pattern regime. Together they decide whether the field grows coral-like blobs, splits and multiplies, or grows thin filaments. Small moves change the character a lot, so nudge these rather than sweep them.
- **Spread.** How far each note's chemistry diffuses across the grid. More spread reaches further, so notes couple more easily.
- **Span.** The pitch range laid across the width of the field, in octaves, and really this is the coupling knob. A small span packs the notes close so their blooms merge; a wide span spreads them out so each note keeps to itself.
- **Time.** How fast the field evolves. The whole thing moves slowly on purpose; this sets how slowly. Time runs in Free mode; the Sync picker locks it to the host tempo instead.
- **Depth.** One master amount over all four Myc sources at once, so you can ride the whole field's influence up and down without touching each routing.
- **Gain.** How much chemistry each note you play pours into the field. Higher and the bloom grows faster and the voices couple sooner; lower and it stays sparse.
- **Sustain.** How much a held note keeps trickling in. This is what stops a sustained chord from starving the field. The Feed Src picker (below) chooses what drives that trickle.
- **Sync.** Sits in the card header. Free lets Time set the speed; 1/1 to 1/8 lock the field's pulse to the host tempo so it sits in the track.

The four sources

Mycelium gives you four modulation sources, routable from the matrix like any other. Drag the MYC handle on the card onto a knob, or pick them in a matrix row.

- **Myc Value.** How much chemistry sits at this voice's spot, measured against the field's average. A slow swell that tracks how alive the field is around the note. Good on cutoff, on level, on anything you want to breathe.
- **Myc Grad X and Myc Grad Y.** Which way the field is flowing at the voice's spot, across pitch and up the play axis. These cross zero as the pattern creeps past, so they move a target both ways rather than just pushing it one direction. Good on pan, on pitch, on spectral morph.
- **Myc Flow.** How fast the field is changing right there. It sits quiet while things are settled and spikes when the pattern shifts, so reach for it when you want movement that tracks activity rather than level. Good on FM, on a quick filter blip.

Feeding it while you hold

Held notes keep trickling a little chemistry into the field so a sustained chord doesn't starve. The Feed Src picker chooses what drives that trickle: a steady amount (Velocity), per note pressure (Aftertouch, so leaning into one note of a chord grows its bloom and then its neighbours), the mod wheel, or Macro 1. On an MPE controller the Aftertouch setting is the expressive one, because the pressure is per note. See the next chapter.

What to expect

Mycelium is a slow, emergent thing, not an LFO. A single held note is the quiet case: it mostly reads its own bloom, so Value sits at a level and the gradients barely move. Where it comes alive is chords, and time. Hold a close triad for a few seconds and the three voices grow into each other and the chord starts to shift around itself. Play the same chord wide and it stays clean. That difference is the whole point.

● PATCH TIP

Load the "Mycelial Choir" factory preset to hear it set up the way I intended, then build it yourself to learn it: switch Mycelium ON, set Span fairly low, route Myc Value to filter cutoff at a modest depth, and route Myc Flow to FM. Hold a tight chord and leave it. Over a few seconds the cutoff drifts and the FM flickers as the voices feed each other. Then play the same chord an octave apart and notice how much calmer it gets.

MPE and per-note expression

If you play an MPE controller, a ROLI Seaboard, a LinnStrument, a Push in MPE mode, Laura now reads it per note. Each note lands on its own MIDI channel, so its pitch bend, its pressure, and its slide belong to that note alone. Bend one note of a chord and the others stay put. Press harder on one and only it responds.



THE VOICE PANEL. THE MPE BUTTON SWITCHES PER-NOTE EXPRESSION ON; PB RANGE IS THE PER-NOTE BEND RANGE, MSTR BEND THE MASTER WHEEL RANGE.

Three things drive this, and all three are modulation sources whether or not you're on an MPE controller:

- **Pressure.** Channel pressure or polyphonic aftertouch, how hard you're leaning on the note. Per note on an MPE rig.
- **Timbre.** CC 74, the up and down slide axis on most MPE controllers. Also per note.
- **Mod Wheel.** CC 1. Usually one global control rather than per note, so it moves everything together.

Route any of them from the mod matrix the same way you'd route an LFO. Pressure to cutoff is the obvious place to start. Timbre to spectral morph, or to a wavetable position, is where MPE starts to feel like an instrument.

Turning MPE on

There's an MPE switch in two places, the cog menu and the VOICE panel, and they're the same setting. It's global, not part of the patch, because MPE is a property of your controller and your DAW track, not of a sound. Switch it on once and it stays on across presets and sessions. If your controller announces its MPE setup when it connects, Laura reads that and configures itself, so often you don't have to touch the switch at all.



THE SAME MPE SWITCH IN THE COG MENU. IT'S A GLOBAL SETTING, SO IT STICKS ACROSS PRESETS AND SESSIONS.

Pitch bend range

MPE uses two bend ranges and Laura keeps them apart. The per note range, how far a finger slide bends a single note, is the PB Range knob on the VOICE panel; MPE controllers expect this wide, usually 48 semitones, so a slide can travel across the keyboard. The master range, how far the main pitch wheel bends the whole performance, is the Mstr Bend knob next to it, and it's usually small, a semitone or two. If your controller tells Laura its ranges, those win.

Where it works, and where it doesn't yet

Per note expression works on normal polyphonic patches, which is how you'll play MPE nearly all the time. Two cases fall back to global expression rather than per note: the Mono and Legato voice modes, which collapse a chord down to one voice by design, and the sequencer's own notes. The master pitch wheel still works in those cases, just not the individual per note bends. If you're playing an MPE controller, keep the patch in Poly.

A small note from me

Thanks for reading this far. Or for skipping to here from the cover, if that's how you read manuals; I do that too.

Laura is a one person project. I'm an engineer first and a home studio producer second, and I built this synth because I wanted a polysynth that did the specific things I cared about: fractals as oscillators, a filter that sounded alive, a sequencer that drew its own melodies, and a modulation system that didn't get in the way. Once I had it for myself, it seemed wasteful not to share it.

Everything in Laura is in service of one idea: that a synth should feel like an instrument, not a configuration screen. If you're tweaking and the sound is getting better, the UI is doing its job. If you're tweaking and getting lost in menus, I haven't done my job well enough and I'd like to hear about it.

Two ways to get in touch:

- **Bugs, license issues, anything broken.** Email support@lostsynapse.store. I read every message. Replies are usually same day.
- **Feature ideas, patch shares, photos of your studio with Laura running.** Same email. I like all of those.

If you make something with Laura that you're proud of, I'd love to hear it. Tag *Lost Synapse* on whatever platform you use, or send a link directly. Knowing the synth is making it into actual records is what makes the late nights of building it feel worth it.

Take care of yourself, and happy programming.

Ionut
Lost Synapse