E■ Fractal Power Module & Spectral Algebraics

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1. Overview
This project presents a novel synthesis architecture based on the exceptional Lie algebra E■, combined with a qutrit-state control paradigm and golden-ratio (ϕ) frequency scaling. The result is the E■ Fractal Power Module, designed for deep generative audio modulation, recursive fractal LFO networks and evolving harmonic textures.

3. Implementation & Deliverables
Control-Layer Code: C++ pseudocode for JUCE integration; Python/NumPy module for research reproducibility.
Producer.ai Rack Specification: YAML module description with UI mapping, modulation outputs and three tailored presets: “Coxeter Orbit”, “ϕ-Pulse Grit”, “E8 Pad Swell”.
Demo Recording & Spectral Analysis: ‘Quantum Drift’ demo audio, spectrograms showing ϕ-band harmonic clusters, dataset summary CSV and annotated visuals.

4. Spectral Analysis Snapshot

7. References

Slade, T. (2025). Spectral Algebraics: Audible Geometry via E■-Inspired Signal Synthesis and 3D Visualization. Zenodo. https://doi.org/10.5281/zenodo.17557541