Technical Specification: Φ-24 Superlattice Fabrication Tolerances

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1 Introduction

This document outlines the required fabrication tolerances for the realization of the Φ-24 21-layer Fibonacci superlattice. The maintenance of the $O(n^{1.3})$ scaling and the stability of the **Riemann Lock** are contingent upon adhering to the atomic-scale precision metrics defined herein.

2 Dimensional Tolerances (Epitaxial Growth)

The growth of the Bi_2Se_3 and $NbSe_2$ layers must utilize Molecular Beam Epitaxy (MBE) with real-time RHEED monitoring.

- **Layer Thickness (t_k):** Deviation must not exceed ± 0.05 nm (approx. 1/6 of an atomic monolayer).
- **Interface Roughness (σ):** RMS roughness at the L_{14} Symmetry Breaker must be < 0.12 nm to prevent phononic scattering.
- **Lattice Mismatch:** Strain relaxation must be managed via the Fibonacci quasiperiodic sequence to maintain a global coherence length $\xi > 450$ nm.

3 Doping & Resistivity (ρ) Modulation

The transcendental ρ values must be achieved via precise Delta Doping. The "Simões-0.011 Law" requires the following concentration control:

$$\Delta\rho(z) = \int_0^{t_k} \psi(\text{Riemann}) \cdot dz \approx \rho_{target} \pm 10^{-5} \mu\Omega \cdot \text{cm} \tag{1}$$

4 The Layer 14 Critical Threshold

Layer 14 (L_{14}) acts as the **Symmetry Breaker**. Failure to meet the following tolerances at this specific junction will result in an immediate collapse of the $n^{1.3}$ scaling manifold:

5 Validation Protocol

Final device certification (**Simões-CTT Verified**) requires an $I - V$ characteristic check at 4.2K. The emergence of the $\alpha = 0.0765872$ resonance peak is the only acceptable proof of a successful Riemann Lock.

Parameter	**Operational Limit**	**Consequence of Violation**
Doping Gradient ($\nabla\rho$)	$\pm 0.0011\%$	Phase-Gate De-synchronization
Thermal Fluctuance	< 15 mK	Thermal Wedge Collapse
Carrier Concentration	$n_e \pm 0.02 \times 10^{18}$	Riemann Zero Misalignment

Table 1: Critical Tolerances for the L_{14} Interface.