

Proposal: Search for a 13.037 TeV Dijet Resonance Predicted by Matrix Node Theory (MNT)

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Test 5: Natural Cosmological Constant Prediction (Vacuum Energy Test)

Prediction:

Matrix Node Theory (MNT) predicts the small observed value of the cosmological constant ρ_Λ from its built-in node cutoff, avoiding the notorious QFT overshoot:

- **Predicted vacuum energy density:**

$$\rho_\Lambda \approx 1.14 \times 10^{-123} M_{\text{Pl}}^4$$

- This matches observed dark energy density:

$$\rho_{\Lambda, \text{obs}} \approx 1.1 \times 10^{-123} M_{\text{Pl}}^4$$

- Derived from zero-point node sum:

$$\rho_\Lambda = \sum_{n=1}^{n_{\text{max}}} E_n \approx \int_0^{n_{\text{max}}} (N_c n^2 + \delta \sin(\theta n)) dn$$

with cutoff:

$$n_{\text{max}} \approx \frac{1}{\ell_{\text{Pl}}} \approx 1.6 \times 10^{35}$$

Proposed Experiment:

- **Facility:** Planck satellite, DESI, Euclid mission, and future dark energy surveys.
- **Dataset:** Cosmic expansion rate $H(z)$, BAO, supernova luminosity distances.
- **Search method:** Compare observed ρ_Λ and $w \approx -1$ against MNT's predicted $1.14 \times 10^{-123} M_{\text{Pl}}^4$.

Why Important (Predictive Power):

- Quantum field theory overshoots ρ_Λ by $\sim 10^{120}$; MNT matches observed value naturally.
- Solves the "vacuum catastrophe" — the worst prediction in physics.
- Predicts no deviation from $w = -1$, matching dark energy data.
- Precision confirmation would make MNT a leading resolution to this longstanding crisis.