VAM Beam–Swirl Interaction Spectrum

Æther Dynamics Model

1. Introduction

In the Vortex Æther Model (VAM), fusion events are governed by the overlap between external beam-induced swirl modes and the natural swirl eigenfrequencies of vortex knots. This document formalizes the interaction and presents a spectral yield curve.

2. Swirl Coupling Formalism

We define the fusion excitation yield Y_{VAM} as the spectral overlap:

$$Y_{\text{VAM}} = \int_0^\infty \rho_{\text{beam}}(\omega) \cdot \sigma_{\text{knot}}(\omega)\, d\omega \tag{1}$$

where:

- $\rho_{\text{beam}}(\omega)$ is the Gaussian spectral energy density of the injected beam:

$$\rho_{\text{beam}}(\omega) = A \exp\left(-\frac{(\omega - \omega_0)^2}{2\Delta\omega^2}\right)$$

- $\sigma_{\text{knot}}(\omega)$ is the vortex knot's absorption spectrum modeled as a sum of Lorentzians:

$$\sigma_{\text{knot}}(\omega) = \sum_n \frac{B_n \Gamma_n^2}{(\omega - \omega_n)^2 + \Gamma_n^2}$$

3. Numerical Simulation

We model:

- A beam centered at frequency $\omega_0 = \frac{C_e}{r_c}$
- Three vortex species with resonances near ω_0

4. Interpretation

The model confirms that fusion is enhanced when the injected swirl field (from laser-accelerated ions) matches one or more knot resonance modes. Broader beams engage multiple knot species; narrow-band beams offer precision tuning for maximal yield.

/mnt/data/vam_swirl_yield_plot.png

Figure 1: Spectral overlap of beam and vortex knot absorption functions. The fusion yield $Y_{\mathrm{VAM}}(\omega)$ peaks where resonance occurs.