Snapshot: Vortex æther Model

Dipolar Shells, Superfluid Phases, and Pressure Equilibria

Omar Iskandarani

June 06, 2025

1 Two-Phase æther Hypothesis

We propose that physical space consists of a superfluid æther phase and a non-superfluid knot-core phase. The outer region behaves like inviscid superfluid flow, while the inner region (the knot core of a vortex ring or trefoil) manifests mass and charge.

In perfect superfluid conditions (like in Helium-4 below 2.17 K), vortex cores are topologically stable and exhibit quantized circulation. Viscosity is zero, and classical irrotational outer flow does not emerge unless boundary constraints force reconnection.

2 Dipolar Torus Pressure Field

The source–sink structure of a toroidal vortex ring creates a dipolar pressure field. We model this as:

$$p(x) = \sum_{n=1}^{\infty} (-1)^n \cdot \frac{1}{2^n}$$

This series approximates how opposing pressure lobes decay radially with alternating sign, forming a spherical pressure equilibrium zone—a natural æther "bubble" defining atomic boundary.

2.1 Bernoulli Formulation

The pressure from an irrotational field is approximated by:

$$p(\vec{r}) = p_\infty - \frac{1}{2}\rho_æ|\vec{v}(\vec{r})|^2$$

2.2 Biot–Savart Falloff

For circulation Γ, pressure decays as:

$$p(r) = p_\infty - \frac{\rho_æ\Gamma^2}{8\pi^2 r^2}$$

Setting a threshold $p = p_{\text{core}}$ defines the effective vortex pressure shell radius:

$$r = \sqrt{\frac{\rho_{\text{æ}}\Gamma^2}{8\pi^2(p_\infty - p_{\text{core}})}}$$

3 Wave–Vortex Duality and Atomic Shells

The document *"Wave–Vortex Dualiteit"* reinforces the view that the merging of wavefronts from two cores produces a boundary of identity loss—interpreted here as the shell of an atom. These boundaries form from pressure gradient cancellation and represent the energetic cutoff of vortex influence.

4 Lagrangians Used

4.1 Gross–Pitaevskii Lagrangian (for Superfluid Phase)

$$\mathcal{L}_{\text{GP}} = \frac{i\hbar}{2}\left(\psi^*\partial_t\psi - \psi\partial_t\psi^*\right) - \frac{\hbar^2}{2m}|\nabla\psi|^2 - \frac{g}{2}|\psi|^4$$

4.2 VAM Swirl Field Lagrangian

$$\mathcal{L}_{\text{VAM}} = \frac{1}{2}\rho_{\text{æ}}\left(\partial_t\vec{S}\right)^2 - \frac{1}{2}C_e^2\left(\nabla\cdot\vec{S}\right)^2 - \frac{\lambda}{4}(\vec{S}\cdot\vec{S})^2$$

This models excitations and torsional solitons in the superfluid æther medium.

5 Future Work

- Derive numerical estimates of bubble shell radius using C_e, Γ, and F_{max}
- Investigate torsional shockwave propagation through the swirl field
- Use field overlap to model particle interactions as vortex interference