Long-Distance Swirl Gravity from Chiral Swirling Knots with Central Holes

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Abstract

We derive long-range gravitational attraction in Swirl–String Theory (SST) as a direct consequence of *chiral swirling knots*—topological vortex filaments such as the trefoil (3_1), cinquefoil (5_1, 5_2), and stevedore (6_1). Each knot encloses a central rotational line, which acts as an anchor of circulation. Using Cauchy's integral theorem, we show that the circulation measured around any loop enclosing this axis is quantized by the knot's winding number. This quantization is expressed by the Swirl Clock $S_t^{\circlearrowleft}$, and its persistence explains why neutral molecules (e.g. H_2) attract in otherwise flat space: their knots are connected via the same central swirl line extending beyond the equal-pressure boundary.

1 Chiral Swirling Knots and Central Holes

Consider a chiral knot K embedded in $\mathbb{R}^3$, such as:

$$3_1 \text{ (trefoil)}, \quad 5_1 \text{ (cinquefoil torus)}, \quad 5_2 \text{ (cinquefoil twist)}, \quad 6_1 \text{ (stevedore)}.$$

Each knot can be parametrized on a torus with major radius R and minor radius r. The core tube of radius r_c supports a tangential swirl velocity $\mathbf{v}_{\circlearrowleft}$, defining the *Swirl Clock* $S_t^{\circlearrowleft}$.

A defining feature is that all these knots possess a *central hole* threaded by a straight axis (taken as the z-axis). This axis is the "fabric line" of flat space: it is the singularity in the analytic swirl potential.

2 Cauchy Integral and Circulation Quantization

Let C be a closed loop in the x–y plane encircling the z-axis. By Cauchy's integral theorem, for an analytic swirl potential $W(z) = \Phi + i\Psi$,

$$\oint_C \mathbf{v}_{\circlearrowleft} \cdot d\mathbf{l} = \begin{cases} 0, & \text{if no singularity inside,} \\ 2\pi i \,\mathrm{Res}\big(\frac{dW}{dz}, z = 0\big), & \text{if axis enclosed.} \end{cases} \tag{1}$$

In SST, the residue corresponds to the circulation quantum

$$\kappa = 2\pi \, v_c \, r_c, \tag{2}$$

where v_c is the swirl speed at the core boundary r_c.

If the knot winds around the axis n times (its *linking number*),

$$\Gamma_C = n\kappa. \tag{3}$$

This is the Cauchy–Kelvin equivalence: long-distance swirl circulation is locked to integer multiples of κ by topology.

3 Swirl Clock and Chiral Gravity

The Swirl Clock $S_t^{\circlearrowleft}$ connects circulation to time dilation:

$$dt_{\mathrm{local}} = dt_{\infty}\sqrt{1 - \frac{\|\mathbf{v}_{\circlearrowleft}\|^2}{c^2}}. \tag{4}$$

Chirality (left- vs right-handed knotting) determines whether $S_t^{\circlearrowleft}$ advances forward (matter) or backward (antimatter) relative to the background.

Thus, two chiral knots coupled through the same central line experience a net pressure gradient:

$$\Delta p = -\tfrac{1}{2}\rho_f \, \|\mathbf{v}_{\circlearrowleft}\|^2, \tag{5}$$

which is transmitted outward along the axis and manifests as *swirl gravity.*

4 Hydrogen Molecules in Flat Space

Even in Euclidean space (no curvature), two hydrogen molecules each represented by a chiral trefoil (3_1) have their central holes threaded by the same fabric axis. Their swirl clocks couple via the shared circulation residue:

$$\Gamma_{\mathrm{H}_2-\mathrm{H}_2} = \kappa_{(1)} + \kappa_{(2)}.$$

This explains why neutral molecules attract at long range: the attraction is not from spacetime curvature but from *quantized swirl circulation anchored to a shared axis.*

5 Conclusion

Long-distance gravitational attraction in SST is a manifestation of topological quantization: chiral knots with central holes enforce non-vanishing circulation residues along a central line. This mechanism is general across knots $3_1, 5_1, 5_2, 6_1$, and directly explains molecular-scale attraction in flat space.

References