

# Controlling Gravitational Behavior in the Swirl–String Theory Framework

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## Abstract

Swirl–String Theory (SST) models matter as quantized vortex filaments moving within a pervasive, inviscid “swirl medium”. In this picture, what we call gravity arises from pressure deficits produced by the swirling cores rather than from spacetime curvature. This paper asks a practical question: *if SST is the right effective description, what would “controlling gravity” look like within its rules?* I summarize the SST constants and bounds that fix the scale of any effect and then outline three classes of control: (i) modulating strength by adding or countering circulation; (ii) imposing directionality by aligning structures, phasing oscillations, or using bulk rotation; and (iii) attempting shielding, reflection or redirection by topological and dynamical means. For each, I discuss feasibility, energetic thresholds, and SST’s built-in maximum-force limit. A key falsifiable prediction highlighted here is that any topological change to the swirl network that modifies gravitational coupling must co-emit a discrete electromagnetic impulse of fixed magnitude. The overall conclusion is conservative: macroscopic “gravity control” demands energy densities that push against SST’s own limits, yet small, testable effects may be accessible in superfluid or Bose–Einstein–condensate analogs.

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# 1. Background and Setup

Swirl–String Theory (SST) posits a flat background filled by an inviscid, incompressible swirl medium. Matter corresponds to topological vortex filaments (“swirl strings”) with core radius  $r_c \sim 10^{-15}$  m and quantized core swirl speed  $v_\odot \approx 1.09 \times 10^6$  m s<sup>−1</sup>. The ambient fluid mass density is very low ( $\rho_f \approx 7 \times 10^{-7}$  kg m<sup>−3</sup>), but the vortex core stores a large mass-equivalent energy density  $\rho_{\text{core}} \sim 3.9 \times 10^{18}$  kg m<sup>−3</sup>. The quantum of circulation is

$$\kappa \equiv 2\pi r_c v_\odot. \quad (1)$$

Gravitational attraction emerges as a pressure deficit created by these structures: co-rotating strings *deepen* a shared pressure well, analogously to parallel vortices that pull together in a superfluid.

For large separations ( $r \gg r_c$ ), a softened “swirl Coulomb” potential captures the long-range behavior:

$$V_{\text{SST}}(r) \simeq -\frac{\Lambda}{r^2 + r_c^2}, \quad |\mathbf{a}_g| \sim \left| \frac{d}{dr} \frac{\Lambda}{r^2 + r_c^2} \right| \approx \frac{2\Lambda}{r^3} \quad (r \gg r_c), \quad (2)$$

with strength set by a constant  $\Lambda$  built from  $(\rho_{\text{core}}, v_\odot, r_c)$ . The emergent coupling  $G_{\text{swirl}}$  is calibrated to recover Newton’s constant  $G_N$  under ordinary conditions. SST also mirrors the general-relativistic upper bound on force via a maximum gravitational force  $F_{\text{gr}}^{\text{max}} \sim 3 \times 10^{43}$  N; attempts to exceed it push the medium into nonlinearity or breakdown.

**Useful intuition.** When three quark-vortices merge into a “baryon tube,” the circulation adds ( $\Gamma_{\text{baryon}} = 3\kappa$ ), increasing rim speed and deepening the core pressure deficit (read: larger rest mass). Likewise, two composite tubes that share an axis add their circulations; the combined pressure well between them is deeper than either alone.

## 2. Modulating Gravitational Strength

### 2.1 Strengthening attraction: additive circulation

Within SST, “more linked circulation” means a deeper pressure deficit and thus stronger attraction. Mechanisms include aligning multiple filaments, exciting higher-circulation modes, or coaxially *sharing* a vortex core between composite structures. In effect, these increase  $\Lambda_{\text{eff}}$  in  $V_{\text{SST}}$  and raise  $|\mathbf{a}_g| \propto \Lambda_{\text{eff}}/r^3$ .

*Practical ceiling.* Macroscopic boosts require fantastically large  $\Lambda_{\text{eff}}$ , i.e., vast numbers of circulation quanta or core energy densities approaching the theory’s limits. This quickly runs into the  $F_{\text{gr}}^{\text{max}}$  bound and the finite  $v_\odot$ , so dramatic amplification at human scales is not realistic.

### 2.2 Weakening attraction: opposing circulation

To suppress attraction, one seeks to *undo* linking circulation. Counter-rotating (opposite-chirality) flow can raise local pressure—a “hill” that offsets the usual well. In fluid mechanics, vortex–antivortex pairs do not bind; in SST, carefully arranged opposite-chirality fields could reduce or, in principle, reverse the net pull in a region. A more global (and speculative) route would vary medium parameters such as  $\rho_f$  or the effective swirl polarization; because  $G_{\text{swirl}}$  derives from these, changing them changes the apparent strength of gravity. Both ideas face stability and energy constraints.

### 3. Directional and Anisotropic Control

SST is intrinsically directional because vortex lines have axes. Attraction is strongest when structures are coaxial and weaker off-axis. Three levers follow.

- **Alignment and focusing.** Arranging many filaments so their circulation is coherently directed can concentrate the field along a chosen axis, akin to a weak “gravitational flash-light.”
- **Phased oscillations.** Small oscillations of the swirl network admit interference. A phased ring or array could weakly enhance the field on-axis and cancel in the plane, analogous to a phased antenna—but only at tiny amplitudes.
- **Bulk rotation.** Rapid rotation injects kinetic pressure that partially offsets the static deficit in the equatorial plane, yielding a mild polar–equatorial anisotropy (an SST cousin of frame dragging).

Define conceptually  $G_{\text{swirl}}(\theta)$  as the effective coupling at polar angle  $\theta$  relative to a chosen axis. In natural settings it is nearly isotropic, but purpose-built alignment could introduce a measurable (likely minute) angular dependence.

### 4. Shielding, Reflection, and Redirection

**Shielding (screening).** A topological “swirl cage”—a shell whose currents prevent linking between interior and exterior loops—could, in principle, cancel external fields inside, like a Faraday cage for pressure deficits. Realizing this likely requires opposite-chirality flows that mimic negative-mass behavior and would be metastable and energy intensive.

**Reflection and refraction.** Dynamic disturbances (the SST analog of gravitational waves) should partially reflect or refract at interfaces where the medium’s effective stiffness or swirl polarization changes, by the usual impedance-mismatch logic. Rapidly rotating structures may also scatter perturbations, echoing superradiance analogies, though only weakly at accessible speeds.

**Redirection by flow.** Moving media drag signals (Fizeau-like effects). A large-scale circulating flow could gently deflect a background field around an object, acting as a very weak prism or mirror. Significant redirection would demand relativistic flow speeds, which are out of reach given  $v_{\text{O}} \ll c$ .

### 5. Feasibility, Energy Scales, and Falsifiable Signatures

**Energetics.** As a crude scaling, to counter Earth’s  $g \simeq 9.8 \text{ ms}^{-2}$  over meter scales would require  $\Lambda_{\text{eff}}$  orders of magnitude above the canonical value (think  $10^{14} \text{ J m}$ ), far beyond practical means. The  $F_{\text{gr}}^{\text{max}}$  bound and finite core parameters together cap any realistic device well below macroscopic control.

**Electromagnetic co-signature.** SST ties gravity-like changes to electromagnetism: any *topological* change in the swirl network (creating, annihilating, reconnecting loops) should produce a discrete electromagnetic impulse of fixed magnitude  $\Delta\Phi = \pm\Phi_\star$  (comparable to a flux quantum), implying tiny, sharp voltage spikes ( $\sim 10^{-3}$ – $10^{-6}$  V) when “switching” a configuration. This offers a clear experimental handle: gravity modulation without the EM blip would falsify the SST mechanism.

**Near-term tests.** Laboratory superfluids provide analogs. Co-rotating quantized vortices attract and can bind; engineered mixtures of opposite circulation in a condensate could display chirality-dependent weak interactions between test bodies. Looking for the predicted EM pulses during vortex reconnections or nucleation events is within current reach.

## 6. Conclusions

Within the rules of Swirl–String Theory, “gravity control” reduces to manipulating circulation and topology in an inviscid medium. Strengthening requires additive circulation; weakening needs carefully phased opposing flows or altered medium properties; directionality comes from alignment, phasing, and rotation; and shielding or redirection demand topological cages or strong flow gradients. All roads run into the same realities: steep energy requirements, stability issues, and an SST maximum-force bound. Nevertheless, the framework yields concrete, falsifiable signatures and small, testable effects in table-top analogs. That combination—clear limits plus clear predictions—is what makes the exercise scientifically useful.

**Notes on sources.** The ideas summarized here follow the SST canon (v0.5.10) and related notes on topological gravity via swirling knots. Where specific numbers are quoted (e.g.,  $r_c$ ,  $v_\odot$ ,  $\rho_f$ ,  $\rho_{\text{core}}$ ,  $F_{\text{gr}}^{\text{max}}$ ), they are the canonical values used for calibration in those documents.

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## References

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