Navier-Stokes Global Regularity — RTSG

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The Core Argument

Blow-up = vortex nucleation in Will Field = $|W(\mathbf{x}_0, T^*)| = 0$.

The GL free energy barrier prevents this: the $|W|^4$ term creates a barrier

$$E_{barrier} = \frac{\alpha W_0^2}{2} + \frac{\beta W_0^4}{4} > 0$$

The Navier-Stokes energy inequality gives $E(t) \leq E_0 < \infty$.

If $E_0 < E_{barrier}$: no vortex. No blow-up. Global regularity.

The Unifying Statement

Three Millennium Problems, one GL action:

Problem	GL regime	Physical meaning
Quantum gravity	Phase mode $\partial^2\theta = 0$	Graviton = massless Goldstone
Yang-Mills gap	$\Delta = \sqrt{\alpha_{IR}}$	Correlation length = mass gap
Navier-Stokes	$E_0 < E_{barrier}$	Energy bounds vortex nucleation

One field. One symmetry. One action.

Remaining Gap

Explicit formula for $\alpha(u_0)$ — express the GL mass parameter in terms of the initial velocity field. Show $\alpha(u_0) > 0$ whenever $u_0 \in H^\infty$ with $E_0 < \infty$.

Cross-references

- GL Theory of Instantiation
- Quantum Gravity
- Yang-Mills