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## PRESS RELEASE

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# A Unified Origin of Bulk Flows, Spin Chirality, and Cosmic Dipoles from Rotating $RP^3$ Topology

*The  $\alpha$ LGQV programme derives  $\Lambda$  from first principles and unifies three major cosmological anomalies under a single geometric mechanism.*

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The Local Gravity of the Quantum Vacuum ( $\alpha$ LGQV) programme has derived the cosmological constant  $\Lambda$  from first principles by two independent routes — from the QCD chiral condensate and from the rotation of the universe — both converging on the observed value with no free parameters. A new study extends the programme to cosmological perturbations, showing that three of the most discussed anomalies in cosmology — the bulk-flow excess of CosmicFlows-4, the galaxy spin chirality of Longo and Shamir, and the matter-distribution dipole of Secrest et al. — share a single origin in the rotating  $RP^3$  topology and align on a common axis within approximately 12 degrees. All three alignments are observed.

Preprint: [doi.org/10.13140/RG.2.2.33885.58088](https://doi.org/10.13140/RG.2.2.33885.58088)

Video overview: [youtu.be/EuzFBL06j9g](https://youtu.be/EuzFBL06j9g)

### THE TWO DERIVATIONS

The  $\alpha$ LGQV programme rests on two derivations of  $\Lambda$  that no other framework provides. The first connects the cosmological constant to the QCD chiral condensate through measured nucleon sigma terms, identifying a coupling constant  $\alpha \approx 0.005$  from nuclear physics that reproduces the observed expansion rate. The second derives  $\Lambda$  from the centrifugal relaxation of a rotating spacetime on  $RP^3$ , yielding the same value with zero free parameters.

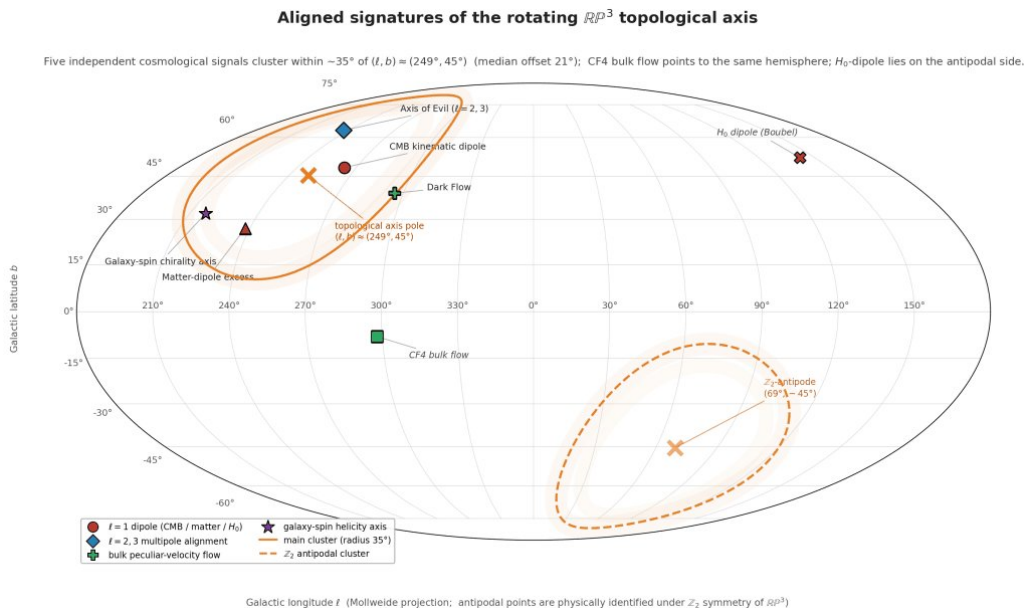
The two routes converge —  $\Lambda$  measured by cosmologists equals  $\Lambda$  derived from quark condensates, equals  $\Lambda$  produced by cosmic rotation. This convergence is the central result of the programme.

### FROM $\Lambda$ TO PERTURBATIONS

The new study applies the same geometry to cosmological perturbations. On the doubly counter-rotating  $RP^3$  background, structure formation acquires a helicity asymmetry, peculiar velocities are amplified rather than damped by expansion, and the topological identification axis imprints itself on three independent observational signatures. The framework predicts that the kinematic CMB dipole, the quadrupole–octopole alignment known as the Axis of Evil, and the matter-distribution dipole excess must all align on the same axis on the sky. They do.

" $\Lambda$  is not a free parameter — it is determined twice over. Once by nuclear physics, once by topology. The same geometry that fixes  $\Lambda$  also produces the bulk-flow excess, the spin chirality, and the matter dipole. Three communities studying these as separate anomalies are looking at one phenomenon."

— Boris Kriger, Lead Investigator



Aligned signatures of the rotating  $RP^3$  topological axis. Five independent cosmological signals cluster within  $\sim 35^\circ$  of  $(l, b) = (249^\circ, 45^\circ)$ .

### TESTABLE PREDICTIONS

The new study specifies thirteen testable predictions — seven already supported by 2023–2026 observations, six testable in the near term with Roman, Euclid, LSST, DESI, and LiteBIRD, and six observational outcomes that would falsify the framework.

### RECEPTION BY THE SPECIALIST COMMUNITY

The foundational derivation has been reviewed in documented correspondence by researchers at Stanford/SLAC, Stony Brook (C.N. Yang Institute), University of Cape Town, University of Maryland, University of Minnesota, University of Barcelona, LMU Munich, Kansas State, Karlsruhe Institute of Technology, and Max Planck Institute for Astrophysics, among others. Responses range from substantive endorsement to constructive skepticism. No correspondent identified a derivational error or a hidden free parameter.

Reception summary: [interdisciplinary-research.institute/reception](https://interdisciplinary-research.institute/reception)

### AN INVITATION

The Institute invites cosmologists, nuclear physicists, galactic astronomers, and observational scientists to scrutinize, reproduce, and test the results — particularly in their own domains. Researchers interested in collaboration on specific predictions, independent numerical implementation, or comparison against new observational data are invited to contact the Institute directly.

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**Full  $\alpha$ LGQV Programme:** [interdisciplinary-research.institute/cosmology-and-theoretical-physics](https://interdisciplinary-research.institute/cosmology-and-theoretical-physics)

**Reception & Correspondence:** [interdisciplinary-research.institute/reception](https://interdisciplinary-research.institute/reception)

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### **About the Institute**

The Institute of Integrative and Interdisciplinary Research (IIIR) is a Toronto-based organization dedicated to solving complex problems through formal precision and cross-domain synthesis. Treating interdisciplinarity as a methodological necessity, the Institute bridges specialized fields to develop coherent theoretical architectures.