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Constraining gravitational parity violation

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The polarization pattern in the CMB fluctuations can leave an imprint of parity violation in the early universe through a positive measurement of cross-correlation functions that are not parity invariant. Does gravity violate parity? In this talk, I will show how the combination of the recent measurements from the Neutron Star Interior Composition Explorer (NICER) with the measurement of the tidal Love number with LIGO/Virgo observations, can place a constraint on gravitational parity violation. In particular, these constraints are specialized to dynamical Chern–Simons gravity, which is a well-motivated effective theory that introduces parity-violating interactions to the Einstein–Hilbert action. The consistency of these measurements with general relativity, places the most stringent constraint on gravitational parity violation to date, surpassing all other previously reported bounds by seven orders of magnitude.

Author: Mrs CÁRDENAS AVENDAÑO, Alejandro (Fundación Universitaria Konrad Lorenz)

Presenter: Mrs CÁRDENAS AVENDAÑO, Alejandro (Fundación Universitaria Konrad Lorenz)

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