GR22/Amaldi13: TESTING ANISOTROPIC SPACETIMES WITH AN ARRAY OF PULSARS

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In general relativity (GR), gravitation is a manifestation of a 4-dimensional curved manifold, namely the spacetime [1]. In order to incorporate quantum effects, some candidate theories of quantum gravity predict that, the manifold might possess some nontrivial structures, for example, Lorentz and CPT symmetry violations. At leading orders, these violations are fully described within an effective field-theoretic framework, the so-called standard-model extension (SME) [2]. The deviations from GR in the SME will modify the orbital dynamics of a binary system [3], thus they are sensitive to precision timing of binary pulsars [4–7].

In this talk, I will discuss the unique role for an array of pulsars to constrain the anisotropic structures of our spacetime, including

- Testing the mass dimension 4 field operators that violate the Lorentz symmetry [4, 5];
- Testing the mass dimension 5 field operators that violate the CPT symmetry [6];
- Testing the mass dimension 8 field operators that violate the gravitational weak equivalence principle and introduce compactness-dependent accelerations [7].

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