Anisotropic stars as ultracompact objects in general relativity

Guilherme Raposo, 1
Paolo Pani, 1  Miguel Bezares, 2  Carlos Palenzuela, 2  Vitor Cardoso, 3, 4

1 Dipartimento di Fisica, “Sapienza” Universit`a di Roma & Sezione INFN Roma1, P.A. Moro 5, 00185, Roma, Italy
2 Departament de Física & IAC3, Universitat de les Illes Balears and Institut d’Estudis Espacials de Catalunya, Palma de Mallorca, Baleares E-07122, Spain
3 CENTRA, Departamento de Física, Instituto Superior Técnico – IST, Universidade de Lisboa – UL, Avenida Rovisco Pais 1, 1049 Lisboa, Portugal and
4 Theoretical Physics Department, CERN 1 Esplanade des Particules, Geneva 23, CH-1211, Switzerland

Anisotropic stresses are ubiquitous in nature, but their modeling in General Relativity is poorly understood and frame-dependent. In this talk, I will present the first study on the dynamical properties of anisotropic self-gravitating fluids in a covariant framework. I will show that anisotropic stars can be as compact and as massive as black holes, thus providing a proper theoretical framework for the study of ultracompact objects and tests of the black hole paradigm. I will discuss the phenomenology of these objects, showing that their Love numbers vanish in the BH limit and that ultracompact anisotropic stars are associated with gravitational-wave echoes when perturbed.