SEMPARIS – Séminaires en région parisienne

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Seminar of the theory group of APC

Mardi 23 Novembre 2021, 14 :00
APC, seminar room 483A, contact roperpol@apc.in2p3.fr for Zoom meeting details
Domaines : gr-qc

Titre : *Spinning Black Holes Fall in Love*

Orateur : **Alexandre Le Tiec (Observatoire de Paris)**

Résumé : *The open question of whether a black hole can become tidally deformed by an external gravitational field has profound implications for fundamental physics, astrophysics and gravitational-wave astronomy. Love tensors characterize the tidal deformability of compact objects such as astrophysical (Kerr) black holes under an external static tidal field. We prove that all Love tensors vanish identically for a Kerr black hole in the nonspinning limit or for an axisymmetric tidal perturbation. In contrast to this result, we show that Love tensors are generically nonzero for a spinning black hole. Specifically, to linear order in the Kerr black hole spin and the weak perturbing tidal field, we compute in closed form the Love tensors that couple the mass-type and current-type quadrupole moments to the electric-type and magnetic-type quadrupolar tidal fields. For a dimensionless spin 0.1, the nonvanishing quadrupolar Love tensors are 0.002, thus showing that black holes are particularly "rigid" compact objects. We also show that the induced quadrupole moments are closely related to the physical phenomenon of tidal torquing of a spinning body interacting with a tidal gravitational environment.*