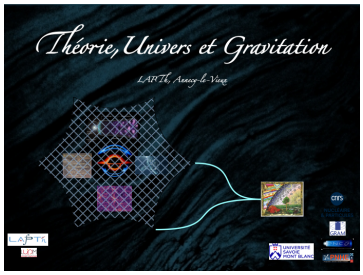

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Algebraically special quadratic Schwarzschild perturbations

mardi 5 novembre 2024 12:00 (20 minutes)

The equations describing linear perturbations around a Schwarzschild black hole admit analytical solutions that describe waves of specific wavelengths propagating outside the black hole. While perturbations around a Schwarzschild black hole are generally of Petrov type I, these analytical solutions describe spacetimes of Petrov type II, and are thus dubbed 'algebraically special modes'. The existence of these modes is linked to the isospectrality theorem for Schwarzschild. In this work, I go beyond the linear approximation and construct algebraically special perturbations around a Schwarzschild black hole at the quadratic order, making use of a family of exact twisting vacuum radiative solutions of General Relativity. These quadratic perturbations can still be expressed analytically, similarly to their linear sources. I study their properties and show in particular how static quadratic perturbations deform the Schwarzschild black hole.

Authors: BEN ACHOUR, Jibril (Arnold Sommerfeld Center for Theoretical Physics); ROUSSILLE, Hugo (École Normale Supérieure de Lyon)

Orateur: ROUSSILLE, Hugo (École Normale Supérieure de Lyon)