Progetto di Ricerca

The proposed research aims at evading known issues emerging in both classical gravity and the standard literature of regular black holes by rethinking the meaning of quantum black hole.
Inspired by some simple arguments from quantum mechanics, the coherent state approach to quantum gravity provides a natural regularisation for black hole interiors. Quantum-corrected geometries within this approach have the classical singularity replaced by an integrable singularity, at which all physical observables remain finite. The result is a black hole geometry with a macroscopic quantum core. Notably, the size of the core, acting as regulator of quantum gravity effects, turns out to be the parameter controlling the deviations (quantum hair) of the geometry from General Relativity affecting the regions outside the event horizon.
The objective of the proposed research is to generalize this simple idea to the case of rotating black holes, investigate their geometry and thermodynamic properties, and shed some light on the physical nature and features of these emerging quantum cores.

Piano delle Attività

The research activities will focus on:

1) the study of possible extensions of the formalism of the coherent state approach beyond the assumptions of staticity and sphericity;
2) the investigation of potential effective gravity theories, beyond General Relativity, capable of producing such emergent geometries;
3) alternative theories of gravity will also be investigated via the effective-fluid approach to scalar-tensor gravity, and the associated thermodynamics.