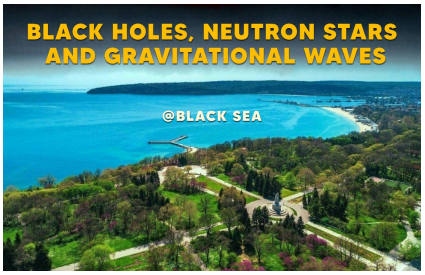


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# Black Holes in massive scalar Gauss-Bonnet using GRFolres

Testing the strong-field regime of gravity has become of great interest in the scientific community following the first gravitational wave detections and the growing theoretical and experimental indications that General Relativity (GR) may require modifications in extreme conditions.
In this context **Scalar-Gauss-Bonnet** (sGB) not only provides a natural framework for such deviations but is also well motivated as it directly arises from fundamental high-energy physics such as string theory.
While massless versions of this theory have dominated past studies, introducing a **scalar mass** is crucial for a more realistic treatment and may reveal new dynamical features.

Starting from the necessity of solving Einstein's equations beyond highly idealized, symmetric cases, **Numerical Relativity** (NR) has proven to be a fundamental tool, central to research in gravitational physics. This has recently led to the development of specialized NR codes capable of handling alternative theories of gravity, such as **GRFolres**.

With this work, I focus on simulating **black holes in sGB gravity**, aiming to improve our current understanding of the role of scalar fields in black hole dynamics and provide benchmarks for future studies.
Furthermore, these simulation serve as a stepping stone towards our final goal of modeling **binary black hole mergers** in modified gravity frameworks.

The presentation will discuss the methodology, the numerical challenges encountered and preliminary results from single black hole experiments, along with an outlook on future binary merger simulations.

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