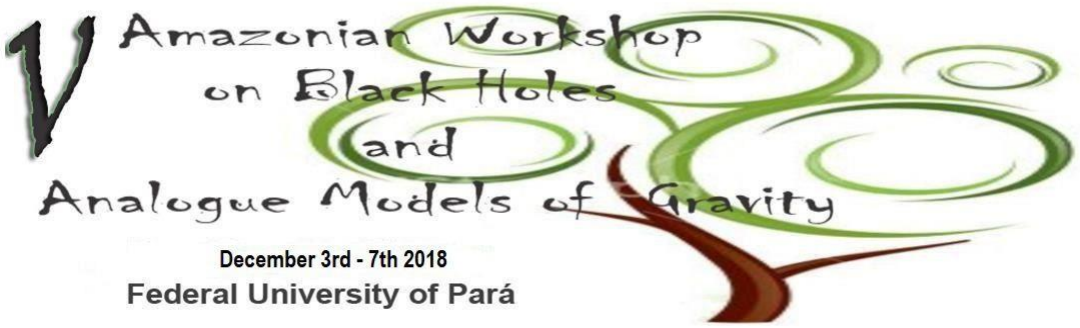

MICHEL ACCRETION FLOWS AND ANALOGUE BLACK HOLES IN ASTROPHYSICS

Olivier Charles Albert Sarbach[1]

[1]Universidad Michoacana de San Nicolás de Hidalgo, México

In this talk some analytic models concerning the accretion of a perfect fluid by a black hole are discussed. We start with a review of the simplest model, namely the spherical steady-state accretion into a Schwarzschild black hole which was introduced by Michel in 1972. We show rigorous results regarding the existence and uniqueness of the Michel flow solution for a large class of equations of state (including polytropic ones). In a next step, we analyze non-spherical linear acoustic perturbations of the Michel flow, the dynamics of which are governed by a scalar wave equation on an effective curved background geometry determined by the acoustic metric. Interestingly, the acoustic geometry has the same qualitative features as an asymptotically flat black hole, and thus represents a natural astrophysical analogue black hole. Using this analogue interpretation, we show that acoustic perturbations of the Michel flow exhibit quasi-normal oscillations. Based on a new numerical method for determining the solutions of the radial mode equation, we compute the associated frequencies and analyze their dependency on the mass of the black hole, the radius of the sonic horizon and the angular momentum number. Finally, we present some preliminary results regarding the description of thin, perfect fluid accretion discs in the equatorial plane of a rotating Kerr black hole.

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