Contributed Talk

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Title: Regular black holes in three dimensions

Abstract: I will present a new broad family of analytic black holes and globally regular horizonless spacetimes in three dimensions. The solutions involve a single real scalar field ϕ which always admits a magnetic-like expression proportional to the angular coordinate. The new metrics, which are characterized by a single function and represent continuous generalizations of the BTZ one, solve the equations of Einstein gravity corrected by a new family of densities (controlled by unconstrained couplings) constructed from positive powers of $(\partial \phi)^2$ and certain linear combinations of $R^{ab} \partial_a \phi \partial_b \phi$ and $(\partial \phi)^2 R$. Some of the solutions obtained describe black holes with one or several horizons. A set of them possesses curvature singularities, while others have conical or BTZ-like ones. Interestingly, in some cases the black holes have no singularity at all, being completely regular. Some of the latter are achieved without any kind of fine tuning or constraint between the action parameters and/or the physical charges of the solution. An additional class of solutions describes globally regular and horizonless geometries.