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Gravity and thermodynamics: a realization in spherically symmetric spacetimes

We propose a thermodynamic framework to obtain exact solutions of Einstein's field equations for spherically symmetric spacetimes based on identifying Komar energy as thermodynamical energy and gravitational entropy as proportional to horizon area. The approach is justified by considering gravitational path integrals with finite boundaries and allows us to understand at which extent the fundamental equation for the entropy can determine the geometry of the spacetime. With this framework, the Schwarzschild, Reissner-Nordström, and de Sitter solutions are derived. Finally, the equations of state corresponding to the mentioned spacetimes are obtained and discussed in the context of emergent gravity.

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