Canadian Association of Physicists
Association canadienne des physiciens et physiciennes

Contribution ID: **2837** Type: **Invited Speaker / Conférencier(ère) invité(e)**

New thermodynamic identities for five-dimensional black holes

Tuesday 4 June 2019 08:30 (30 minutes)

Stationary black hole solutions of classical general relativity satisfy certain identities relating their mass, angular momenta, and charge which are in close analogy with familiar thermodynamic laws. In this talk I will describe new identities for the physical variables of five-dimensional, asymptotically flat, stationary vacuum black holes. Unlike the well known Smarr relation, these identities depend on the topology of the black hole spacetime. The proof employs the harmonic map (sigma model) formulation of the vacuum Einstein equations for solutions in the presence of symmetries.

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Session Classification: T1-9 General Relativity II (DTP) | Relativité générale II (DPT)

Track Classification: Theoretical Physics / Physique théorique (DTP-DPT)