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The Maldacena-Shenker-Stanford Conjecture in General Relativity and beyond

The Maldacena-Shenker-Stanford (MSS) conjecture establishes the existence of an upper bound to the Lyapunov exponent of a thermal quantum system with a large number of degrees of freedom.
Holographic calculations of out-of-time order correlation functions (OTOCs), which are conveniently employed as indicators of the magnitude of quantum chaos, motivate such a statement, leading to the identification of black holes as the fastest scramblers in nature.
This talk aims to give an insight into the universality of the MSS conjecture. We claim that it can be violated in various metric $f(R)$ gravity models as a consequence of the propagation of metric instabilities in a degenerate Schwarzschild-de Sitter background. Then, following a detailed investigation of the Extended Geometric Trinity of Gravity, a set of three dynamically equivalent theories arising from an ad-hoc extension of the corresponding constituting theories of the Trinity of Gravity (namely General Relativity, the Teleparallel Equivalent to General Relativity, and the Symmetric Teleparallel Equivalent to General Relativity), we conclude that the violation occurs independently of the conferred representation of gravity in such a framework.

Authors: Ms FERRARA, Carmen (Scuola Superiore Meridionale); CAPOZZIELLO, Salvatore (INFN - National Institute for Nuclear Physics); CESARE, Sara (Scuola Superiore Meridionale)

Presenter: CESARE, Sara (Scuola Superiore Meridionale)

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