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Invited Talk - Black holes, higher curvature gravity and von Neumann algebras - Suneeta Vardarajan, IISER Pune

Sunday 24 August 2025 10:00 (1 hour)

In recent years, the application of von Neumann algebras to black hole physics has yielded new insights. In the first half of the talk, we discuss the generalized second law (GSL) of black holes in semiclassical gravity. Using von Neumann algebras, in particular, the crossed product, various divergent quantities like the entanglement entropy can be rendered finite. We show how to prove the GSL in crossed product constructions for asymptotically AdS and asymptotically flat black holes including Kerr. In the second half of the talk, we discuss the question of what is the geometry that a string sees. Are horizons a well-defined notion? Recent work in AdS/CFT that answers this question using von Neumann algebras points to the possibility of different fields seeing different horizons. We discuss the connection of these ideas to our recent characteristic surface analysis of higher curvature gravity theories.

Session Chair : Nirmalya Kajuri