MP 14: HV 5: Quantum Field Theory near Black Hole Horizons

Time: Thursday 11:45–12:25   Location: H6

Invited Talk   MP 14.1   Thu 11:45   H6
Temperature and entropy-area relation of quantum matter near spherically symmetric outer trapping horizons — •Rainer Verch — Institut für Theoretische Physik, Universität Leipzig, Germany

We consider spherically symmetric spacetimes with an outer trapping which are generalizations of spherically symmetric black hole spacetimes where the central mass can vary with time. These spacetimes possess in general no timelike Killing vector field, but admit a Kodama vector field which provides a replacement. We investigate a scaling limit of Hadamard 2-point functions of a quantum field on the spacetime onto the ingoing lightlike congruence of a spherical horizon cross-section. The scaling limit 2-point function has a universal form and a thermal spectrum with respect to the time-parameter of the Kodama flow, where the inverse temperature is proportional to the surface gravity of the horizon cross-section. This can be seen as a local counterpart of the Hawking effect for an outer trapping horizon in the scaling limit. The scaling limit 2-point function as well as the 2-point functions of coherent states of the scaling-limit-theory have relative entropies behaving proportional to the cross-sectional horizon area. This is joint work with F. Kurpicz and N. Pinamonti, arXiv:2102.11547.