Contribution ID: **45** Type: **Plenary Talk**

Gravitational Particle Production

Thursday, January 23, 2025 3:35 PM (40 minutes)

This talk discusses a new avenue to particle production in curved spacetimes and black hole evaporation using a heat-kernel approach in the context of effective field theory analogous to deriving the Schwinger effect. Applying this method to an uncharged massless scalar field in a Schwarzschild spacetime, we show that spacetime curvature takes a similar role as the electric field strength in the Schwinger effect. We interpret our results as local pair production in a gravitational field. Comparing the particle number and energy flux to the Hawking case, we find both effects to be of similar order. However, we question the relevance of the presence of a black hole event horizon.

The presentation is partly based on
Wondrak, van Suijlekom, Falcke, Phys. Rev. Lett. 130 (2023) 221502,
Wondrak, van Suijlekom, Falcke, Phys. Rev. Lett. 133 (2024) 229002.

Primary author: Dr WONDRAK, Michael Florian (IMAPP, Radboud University Nijmegen)

Co-authors: Prof. FALCKE, Heino (Astrophyics, Radboud University Nijmegen); Prof. VAN SUIJLEKOM, Walter (Mathematics, Radboud University Nijmegen)

Presenter: Dr WONDRAK, Michael Florian (IMAPP, Radboud University Nijmegen)