



Canadian Association  
of Physicists

Association canadienne  
des physiciens et physiciennes

Contribution ID: 3359 Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

## **(G\*) Quantum Corrections to Hawking Radiation**

*Wednesday 8 June 2022 15:45 (15 minutes)*

Dr. Stephen Hawking's derivation of the eponymous Hawking radiation marked a significant step forward in the ongoing explorations into quantum theories of gravity. However, despite the significance of this work, higher order quantum corrections to the energy flux have not been calculated in most part due to the difficulty of such QFT calculations in curved space. To avoid this, we make use of the universal Hadamard form of the Wightman function in the coincident limit when near the black hole event horizon, where the propagator becomes a function of a single variable  $\sigma$  (the Synge world function). This can then be used to calculate the radial Klein-Gordon energy flux at the horizon and therefore out to infinity. This novel way of calculating the Hawking radiation can lead to further questions on the effects of higher order corrections such as field self-interactions, heavy particle loops, etc. where the details can be added explicitly and without directly performing the curved space QFT calculations.

**Authors:** SCHNEIDER, Mathew (McMaster University); BURGESS, Clifford Peter (McMaster University (CA))

**Presenter:** SCHNEIDER, Mathew (McMaster University)

**Session Classification:** W3-2 Frontiers in Theoretical Physics I (DTP) | Frontières en physique théorique I (DPT)

**Track Classification:** Technical Sessions / Sessions techniques: Theoretical Physics / Physique théorique (DTP-DPT)