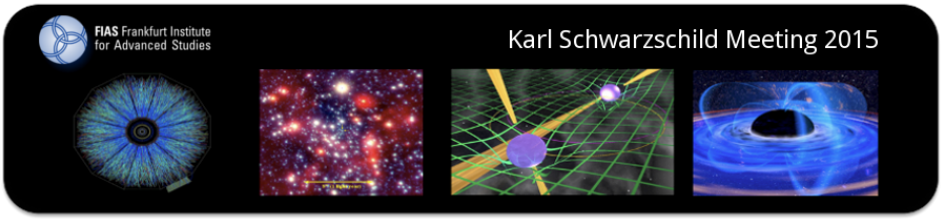

Contribution ID: **50** Type: **not specified**

Thermal Corpuscular Black Holes

Monday 20 July 2015 15:00 (20 minutes)

We study a corpuscular model of evaporating black holes consisting of a large number N of self-confined bosons. The single-particle spectrum contains a discrete ground state of energy m (corresponding to toy gravitons forming a black hole), and a gapless continuous spectrum (to accommodate for Hawking radiation with energy $\omega > m$).
In particular, we consider each constituent in a superposition of the ground state and a Planckian distribution at the expected Hawking temperature in the continuum. We first find that, assuming the leading order effect of the internal scatterings is only to give rise to the Hawking radiation, the corresponding N-particle state can be collectively described by a single-particle wave-function given by a superposition of a total ground state with energy $M = N\,m$ and a Planckian distribution for $E > M$ at the same Hawking temperature.
From this collective state, we compute the partition function and obtain an entropy which reproduces the usual area law with a logarithmic correction precisely related with the Hawking component. By means of the horizon wave-function for the system, we finally show the backreaction of modes with $\omega > m$ reduces the Hawking flux.
Both corrections to the entropy and to the Hawking flux suggest the evaporation properly stops for vanishing mass, if the black hole is in this particular quantum state.

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Session Classification: Student plenary session 1

Track Classification: Students