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Hawking radiation at finite temperature

One of the most revolutionary outcomes of Einstein's general theory of relativity is the Black Hole (BH). In 1974 Stephen Hawking showed that BHs can also emit particles called Hawking radiation. The spectrum of the emitted particles is a black body spectrum. Till now we have considered the BH an isolated one and the particle emission spectrum is a Planckian. But we are interested if the BHs are immersed in a thermal bath, will the emission spectrum going to change? By applying thermal Quantum Field Theory we have shown that if the BHs are immersed in a thermal bath the emission spectrum is not a Planckian anymore and the particle production rate from the BH is now different.

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