

UV Dispersive Effects on Hawking Radiation

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We revisit the connection between Hawking radiation and high-frequency dispersions for a Schwarzschild black hole following the work of Brout et al.. After confirming the robustness of Hawking radiation for monotonic dispersion relations, we consider non-monotonic dispersion relations that deviate from the standard relation only in the trans-Planckian domain. Contrary to the common belief that Hawking radiation is insensitive to UV physics, it turns out that Hawking radiation is subject to significant modifications after the scrambling time. Depending on the UV physics at the singularity, the amplitude of Hawking radiation could diminish after the scrambling time, while the Hawking temperature remains the same. Our finding is thus not contradictory to earlier works regarding the robustness of Hawking temperature.

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