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Limits on the Burst Rate of Exploding Black Holes

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Primordial Black Holes (PBHs) could play a relevant role in several physical phenomena. They are particularly attractive as a candidate for dark matter, seeds of supermassive black holes, sources of gravitational waves, etc. In addition, the observation of an evaporating black hole would provide definitive information on the elementary particles present in nature, including new degrees of freedom beyond the Standard Model. VHE gamma-ray observatories such as HAWC and LHAASO, among others, provide the technology to potentially detect such an extraordinary and unprecedented event. Although the PBH abundance is tightly constrained in the mass range of interest, we critically revisit the assumptions underlying the bounds and study how they are modified in alternative scenarios where a large number of degrees of freedom are introduced. We also provide a realistic assessment of the capacity of current and future VHE gamma-ray telescopes to detect an exploding PBH in the coming years.

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