

# Dark Matter Contributions to the Galactic Center 511keV Gamma-ray Line: Insights from Primordial Black Holes and Beyond-the-Standard-Model Particles.

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The SPI/INTEGRAL observations reveal a remarkable 511keV gamma-ray line in the Galactic center region. However, astrophysical sources solely have not explained the 511keV emission from the positron annihilation. In this study, we explore the role of dark matter (DM) in shedding light on the line's morphology. We postulate that primordial black holes (PBHs), a compelling candidate for DM, emit not only standard model (SM) particles but also bosonic beyond-the-standard-model (BSM) particles, namely the spin-1 dark photon and spin-0 axion-like-particle (ALP), through Hawking radiation. We contend that the decay of these particles leads to the formation of positronium, which subsequently emits the 511 keV gamma-ray line. The results are based on meticulous numerical calculations that account for the Lorentz boost effect in the decay process and are fitted to the observational data. Consequently, we offer constraints on the abundance of PBH and characteristics of BSM particles from the morphology of 511keV line.

## Secondary category for the parallel session (optional)

Dark Matter Physics

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