

Photon Axion Enhancement around PBH

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Dark matter (DM) can be gravitationally captured around a massive compact object, forming a dense halo. If primordial black holes (PBHs) exist, surrounding dark matter particles can be accreted through gravitational attraction, leading to the formation of a DM halo with a steep spike profile near the PBH.

If the dark matter consists of axions or axion-like particles (ALPs), the high number density in the spike region can significantly enhance photon production via stimulated decay. When the axion number density exceeds a critical threshold, photon enhancement becomes efficient, potentially generating a strong electromagnetic signal.

Photons emitted from the dense DM halo surrounding a PBH may propagate to Earth and could be detected in the radio frequency range, providing a possible observational signature of axion dark matter and primordial black holes.

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