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Dish Antenna Searches for WISPy Dark Matter: Directional Resolution and Limitations for Small Masses

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Hidden photon and axion-like dark matter may be detected using spherical reflective surfaces such as in dish antenna setups converting some of the dark matter particles into photons and concentrating them on a detector. These setups may be used to perform directional searches measuring the dark matter momentum distribution.

We present a calculation of the photon distribution one expects to detect with such an antenna in ray approximation and discuss implications on the sensitivity of discovery experiments and on the directional resolution.

Furthermore we consider the regime m_{DM} $lesssim (R_{sp}\, v_{DM})^{-1}$ where the ray approximation does not hold anymore due to photon wavelengths exceeding the expected distribution widths obtained in the ray approximation. We discuss how this affects the expected distributions and experimental implications.

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