

STAX. A search for axion-like particles with sub-THz photons

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We discuss an improved detection scheme for a light-shining-through-wall (LSW) experiment for axion-like particle searches [Capparelli, Cavoto, Ferretti, Giazotto, Polosa and Spagnolo, arXiv: 1510.06892]. We propose to use: extremely intense photon fluxes (from 100 kW to 1MW) from gyrotron sources at frequencies around 30 GHz; single photon detectors in this frequency domain, with efficiency ≈ 1 , based on transition-edge-sensors (TES); high quality factor Fabry-Perot cavities in the microwave domain ($Q \approx 10^4$ - 10^5), both on the photon-axion conversion and photon regeneration sides.

We compute that present laboratory exclusion limits on axion-like particles might be improved by at least four orders of magnitude for axion masses ≤ 0.01 meV.

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