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Axion Star Explosions and the Reionization History of the Universe

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In axion-like dark matter cosmologies a very dense axion star forms in the center of every dark matter halo. When such axion stars are massive enough they become unstable and quickly decay via parametric resonance into radio photons. In this talk, based on 2302.10206 and 2301.09769, I will highlight the cosmological consequences of such a decay. In particular, the huge number of radio photons produced by axion stars decays can heat up the intergalactic medium and lead to an early period of reionization. Planck CMB constraints on this early reionization yield the most stringent bounds on the coupling between axion dark matter and photons in the sub neV mass range. I will finally show that upcoming 21cm observations will be able to test couplings that are an order of magnitude smaller than those currently tested by Planck.

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