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Strong CMB bounds on ALPS form strings

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Axion-like particles (ALPS), radiated from a network of cosmic strings, may be a large part of Dark Matter (DM). In the era of precision Cosmology, it is possible to characterize the effect of such particles - which almost scale invariant distribution function spans many orders of magnitudes in momentum - on the observables. In this work, we employ the CLASS code and Planck 2018 data to place bounds on the abundance and on other distinctive parameters of ALPS from strings. We focus on the mass range 10^-20 - 10^-15 eV, and we find the strongest constraint on the ALP decay constant f_a if the ALP's mass is between (10^-20,10^-18) eV, where we are able to improve the bound on f_a from overabundance of DM by more than a factor of 3. As a result, the ALPS from strings we considered cannot make up for more than one tenth of DM at three sigma, if the ALP mass is between 10^-20-10^-18 eV.

Primary author: IMPAVIDO, Riccardo (Istituto Nazionale di Fisica Nucleare)

Presenter: IMPAVIDO, Riccardo (Istituto Nazionale di Fisica Nucleare)

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