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A global analysis of decaying cosmological ALPs

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Axion-like particles (ALPs) decaying before the time of recombination can have strong implications in a range of cosmological and astrophysical observations. In this talk I present a global analysis of a model of decaying ALP, focusing specifically on their coupling to photons. Exploiting the multidisciplinary nature of the GAMBIT framework, we combine state-of-the-art calculations of the irreducible ALP freeze-in abundance, primordial element abundances (including photodisintegration through ALP decays), CMB spectral distortions and temperature anisotropies, and astrophysical constraints from supernovae and stellar cooling. Most notable among the interesting results that I will present are a definite lower bound on the ALP mass, and a surprising improvement of the fit to the primordial abundances compared to vanilla Λ CDM.

Primary author: Dr GONZALO, Tomas (Karlsruhe Institute for Technology (KIT))

Presenter: Dr GONZALO, Tomas (Karlsruhe Institute for Technology (KIT))

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