

# Constraints on exotic DM models from cosmic dawn observables.

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We use a combination of high-redshift observables to obtain constraints on exotic DM models that suppress the matter power spectrum. These observables include ultraviolet luminosity functions (UVLFs) at redshifts  $2 - 10$  measured by the Hubble Space Telescope, a constraint on the neutral hydrogen fraction from high-redshift quasar spectroscopy, the cosmic microwave background optical depth to reionization measurement from Planck and upper bounds on the 21cm power spectrum from HERA. To facilitate a full Bayesian likelihood analysis, we developed a machine-learning based pipeline, which is both accurate, and enables a swift statistical inference, orders of magnitude faster than a brute force approach. We extract the strongest constraints to date on the fraction of axion fuzzy dark matter (FDM) in the mass window  $10^{-26} \text{ eV}$

$lessim m_{\text{FDM}}$

$lessim 10^{-23} \text{ eV}$ . Additionally we improve the current bounds on the interaction cross section for interacting DM (IDM) models with a velocity dependent cross section.

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**Session Classification:** Contributions