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Cosmology-informed constraints on the fuzzy dark matter mass from dwarf-spheroidal stellar kinematics

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Fuzzy dark matter (FDM) predicts a solitonic core within halos, in contrast to the cuspy inner profiles expected in the standard cold dark matter (CDM) model.
We investigate differences in the inner structure of dark matter halos through the stellar kinematics of dwarf spheroidal galaxies, which place constraints on the FDM particle mass.
We analyze the parameter space using a statistical framework with cosmology-informed priors derived from the Semi-Analytical SubHalo Inference ModelIng (SASHIMI), which restrict the outer NFW-like halo parameters to cosmologically motivated regions.
Guided by recent FDM simulations, we further assume a smooth connection between the inner soliton and outer NFW-like profiles, enabling an efficient constraint on the FDM mass. As shown in the previous study, Segue 1 provides most stringent constraint $m_{\rm FDM}$
$gtrsim 10^{-21}$ eV even when the cosmological priors are taken into account."

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