

# Revisiting Fuzzy Dark Matter Constraints: Accounting for Core–Halo Mass Relation Diversity

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The estimation of the fuzzy dark matter (FDM) particle mass from the Milky Way's dwarf satellite galaxies relies critically on the core–halo mass relation. Previous studies have generally assumed a one-to-one core–halo mass relation, despite growing evidence that this relation exhibits considerable intrinsic scatter. Neglecting this diversity could lead to artificially tight constraints and potentially false exclusions within the allowed FDM particle mass range inferred from stellar kinematics of the Milky Way's dwarf galaxies. Using eight Milky Way dwarf spheroidal galaxies, we re-estimate the allowed range of the FDM particle mass while incorporating the observed diversity in the core–halo mass relation. To further mitigate the degeneracy with the stellar velocity anisotropy—which remains unobservable—we adopt a flexible line-of-sight velocity distribution (LOSVD) by including the fourth-order stellar velocity moments, rather than assuming a conventional, fixed LOSVD form.

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