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## Exploring the Dark Sector (non-abelian DM-DR interaction)

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In this work we derive constraints on interacting dark matter-dark radiation models from a full-shape analysis of BOSS-DR12 galaxy clustering data, combined with Planck legacy cosmic microwave background (CMB) and baryon acoustic oscillation (BAO) measurements. We consider a set of models parameterized within the effective theory of structure formation (ETHOS), quantifying the lifting of the S8 tension in view of KiDS weak-lensing results. The most favorable scenarios point to a fraction  $f \sim 10 - 100\%$  of interacting dark matter as well as a dark radiation temperature that is smaller by a factor  $\xi \sim 0.1 - 0.15$  compared to the CMB, leading to a reduction of the tension to the  $\sim 1\sigma$  level. The temperature dependence of the interaction rate favored by relaxing the S8 tension is realized for a weakly coupled unbroken non-Abelian  $SU(N)$  gauge interaction in the dark sector. To map our results onto this  $SU(N)$  model, we compute higher-order corrections due to Debye screening. We find a lower bound for the fine-structure constant for relaxing the S8 tension, consistent with upper bounds from galaxy ellipticities and compatible with self-interactions relevant for small-scale structure formation.

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