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Constraining Dark Matter Decays at the keV Scale with the NuSTAR Observatory

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Dark matter at the keV scale has become an active topic in the last decade. The NuSTAR x-ray observatory, with its energy bandpass 3–150 keV and wide-angle aperture for unfocused x-rays, is an ideal platform to search for decaying keV-scale dark matter, e.g. sterile neutrinos. Previous NuSTAR analyses constrained much of the sterile-neutrino parameter space for masses ~ 10 –40 keV, improving upon previous instruments by nearly an order of magnitude, but were generally limited at lower masses by the irreducible instrument background. After reviewing our group's previous NuSTAR analyses, I will describe our recent efforts to apply novel background-rejection and modeling techniques to long-exposure spectra of the Milky Way halo, further constraining the parameter space for 6–40 keV sterile neutrinos. These improvements will allow NuSTAR to begin to test some of the models of the 3.5-keV anomaly.

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