

Evidence against the decaying dark matter interpretation of the 3.5 keV line from blank sky observations

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X-ray observations of clusters and galaxies have detected an unexplained X-ray emission line around 3.5 keV. This line has been the subject of many recent works due to its potential explanation as due to decaying dark matter. In particular, sterile neutrinos with a mass of 7 keV and mixing angles of $\sim 10^{-10}$ provide a good fit to the data. I discuss recent work in which we exploit the fact that the Milky Way halo is as bright in dark matter decay as previous targets but has significantly reduced backgrounds. Furthermore, all X-ray observations look through the halo, so there is an abundance of available data. In particular, we used over 30 Ms of XMM-Newton observations of the ambient dark matter halo to search for evidence of this line. We report the strongest limits to-date on the lifetime of dark matter in this mass range and strongly disfavor the possibility that the 3.5 keV line originates from dark matter decay.

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