



Abstract

On Filaments, Prolate Halos and Rotation Curves †

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Abstract: We propose a simple geometrical mechanism for the flattening of galactic rotation curves at large distances, the local compression of field lines around their planes induced either by the presence of thin string-like objects at the centers of galaxies or by elongated dark mater halos, and elaborate on its possible role in nature. We fit 83 rotation curves from the SPARC database with logarithmic potentials produced by a thin “wire” at the origin and then, after selecting 2 galaxies that yield the most interesting fits, analyze them with an alternative model, deformed versions of two popular models of dark-matter halos. Our conclusion is that the presence of a filament clearly improves the fit quality in a number of cases, while bulged dark matter profiles have a lesser effect. If taken at face value, these results would imply the presence of elongated mass distributions away from the galactic plane in a number of galaxies, and may also have some indirect impact on the controversy between cold dark matter (CDM), self-interacting dark matter (SiDM), and modified Newtonian dynamics (MOND).

Keywords: dark matter; halo morphology; cosmic strings



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