


## Abstract

# On Filaments, Prolate Halos and Rotation Curves <sup>†</sup>

Kirill Zatrimeylov 

Research Group in Theoretical Physics, Scuola Normale Superiore di Pisa, 56125 Pisa, Italy;  
kirill.zatrimeylov@sns.it

<sup>†</sup> Presented at the 1st Electronic Conference on Universe, 22–28 February 2021; Available online:  
<https://ecu2021.sciforum.net/>.

**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 matter 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



**Supplementary Materials:** The supplementary file is available online at <https://www.mdpi.com/article/10.3390/ECU2021-09298/s1>.

**Citation:** Zatrimeylov, K. On Filaments, Prolate Halos and Rotation Curves. *Phys. Sci. Forum* **2021**, *2*, 19. <https://doi.org/10.3390/ECU2021-09298>

Published: 22 February 2021

**Publisher's Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Copyright:** © 2021 by the author. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).