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The Evolution of the Dark Matter Paradigm

While Dark Matter (DM) is treated as a single substance in contemporary astrophysics research, the process whereby this DM paradigm has been established is a complex one, involving both theoretical contributions and astronomical observations. In defining this paradigm, we trace the growth in the number of citations since publication for a number of seminal papers. These include theoretical papers, such as those postulating the WIMP, Axion, Sterile Heavy Neutrino and MOND hypotheses respectively. We also consider the papers containing Zwicky's 1933 Coma Cluster calculations, the 1965 discovery of the CMB, the observations of anomalous galaxy rotation curves in the early 1970s, and the results of N-body simulations of disk galaxies. We analyse trends in the citation data for these papers, accounting for the published results of collider searches, DM direct detection experiments, and indirect DM searches. Thus, we assess the impact of new evidence upon the relative prominence of the hypotheses that define the contemporary DM paradigm. We also discuss the potential of multi-messenger astronomy, using next generation telescopes, to further define this paradigm.

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None

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