

Alternatives to dark matter: Modified gravity as an alternative to dark matter

[Jacob D. Bekenstein](#)

(Submitted on 21 Jan 2010)

The premier alternative to the dark matter paradigm is modified gravity. Following an introduction to the relevant phenomenology of galaxies, I review the MOND paradigm, an effective summary of the observations which any theory must reproduce. A simple nonlinear modified gravity theory does justice to MOND at the nonrelativistic level, but cannot be elevated to the relativistic level in a unique way. I go in detail into the covariant tensor-vector-theory (TeVeS) which not only recovers MOND but can also deal in detail with gravitational lensing and cosmology. Problems with MOND and TeVeS at the level of clusters of galaxies are given attention. I also summarize the status of TeVeS cosmology.

Comments: 20 pages, 4 figures

Subjects: **Cosmology and Extragalactic Astrophysics (astro-ph.CO)**; General Relativity and Quantum Cosmology (gr-qc); High Energy Physics - Theory (hep-th)

Journal reference: From 'Particle Dark Matter: Observations, Models and Searches', edited by G. Bertone (Cambridge U. Press, Cambridge 2010) Chap.6, p.95-114

Cite as: [arXiv:1001.3876v1](#) [astro-ph.CO]

Submission history

From: Jacob D. Bekenstein [[view email](#)]

[v1] Thu, 21 Jan 2010 21:01:03 GMT (226kb)

[Which authors of this paper are endorsers?](#)