

# Dark matter density profile and galactic metric in Eddington-inspired Born-Infeld gravity

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## Abstract

We consider the density profile of pressureless dark matter in Eddington-inspired Born-Infeld (EiBI) gravity. The gravitational field equations are investigated for a spherically symmetric dark matter galactic halo, by adopting a phenomenological tangential velocity profile for test particles moving in stable circular orbits around the galactic center. The density profile and the mass distribution, as well as the general form of the metric tensor is obtained by numerically integrating the gravitational field equations, and in an approximate analytical form by using the Newtonian limit of the theory. In the weak field limit, the dark matter density distribution is described by the Lane-Emden equation with polytropic index  $n = 1$ , and is nonsingular at the galactic center. The parameter  $\kappa$  of the theory is determined so that that the theory could provide a realistic description of the dark matter halos. The gravitational properties of the dark matter halos are also briefly discussed in the Newtonian approximation. © 2014 World Scientific Publishing Company.

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## Keywords

dark matter, galactic rotation curves, Modified gravity