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Black holes surrounded by generic dark matter profile: Shadow of black hole and Luminosity of its accretion disk

M Heydari-Fard*, H Razmi, and Z Azad
Department of physics-University of Qom

E-mail: heydarifard@qom.ac.ir

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Abstract
The distribution of dark matter and its effect on the space-time around black holes is a subject that has attracted the attention of many researchers. So far, various distributions of dark matter density in galaxies have been predicted. In 2022 Konoplya and Zhidenko obtained the exact solutions of Einstein's equations with the energy-momentum tensor of a galaxy harboring a central black hole characterized by Burkert, Navarro-Frank-White, and Taylor-Silk density distributions. In the present paper, we obtain the electromagnetic properties of the surrounding accretion disk including the energy flux, temperature spectrum, and luminosity in such space-times. We seek a way to find the nature of dark matter through its effect on the motion of particles around the black hole as well as the observational characteristics of the black hole shadow using the comparison of different dark matter distributions.

Keywords: black hole, dark halo, shadow radius, optical properties, accretion disk

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