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500 Galaxies that Rotate from Baryonic Dark Matter.

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This paper proposes a conceptual framework that predicts the rotational velocity of spiral galaxies with respect to the radial distance from their center of mass, without hypothesizing about any dark matter. It is based on an emergent modified gravity paradigm derived from Einstein's general relativity and relies on erfc scalar field metrics. A short recall of the previously published modified gravity model is first presented, then the theoretical equation describing a galaxy velocity profile is established, based on an emergent parameter, the galaxy's proper length. Levenberg-Marquard curve fitting optimizations on the 551 galaxies of the Sofue (2018) database are reported. The proposed equation fits the galaxy velocity behaviors all over the radial distances from the galactic center of mass. The model predicts, without requiring any dark matter, very good results with an SNR > 20dB in 91% of the 291 galaxies of the C-series (266/291), 81% of the 31 galaxies of the P-series (25/31), and 60% % of the 229 galaxies of the S-series (138/229). Moreover, the whole model is consistent with the Thully-Fischer relationship that can be derived from it. According to the present paradigm, the constant component of the erfc potential associated with a given mass plays the role of a huge baryonic energy reservoir that is involved in the galaxy rotations, fixing for each galaxy, a constant velocity upper limit. In a sense, this baryonic energy relying on a constant gravitational potential can misleadingly be interpreted as a kind of dark matter. Taking the other side of the coin, the velocity profile of galaxies, with their tendency to become constant at a great distance, can be seen as a direct manifestation and support to the whole emergent erfc potential paradigm.

Keyword-1

Galaxy rotation

Keyword-2

Dark matter

Keyword-3

erfc potential

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