

Vector potential for co-rotating and retrograde galaxy curves without dark matter

For circular orbits in the luminous disk of the Galaxy, the Einstein geodesic relations of 1914 apply for low rotational velocities in scalar and 3-vector potentials of weak metric fields. The scalar potential is approximated by the Flynn model for three massive disks. Such a scalar potential does not distinguish between prograde and retrograde rotations, even after the introduction of a dark matter halo. In order not to lose the difference between the orbital velocities of co-rotating and retrograde motion of visible stars in geodetic calculations, the three-vector Einstein potential is maintained and modeled for the equatorial plane. This updated Flynn model reproduces the measured curves of the Galaxy's prograde rotation with high accuracy up to 30 kiloparsecs. Astronomers can use the plotted curve of predicted retrograde velocities (doi.org/10.1016/j.spaceh.2026.100064) to falsify Einstein's geodesics for the slow rotation of the Galaxy without dark matter.

Primary author(s) : Dr BULYZHENKOV, Igor

Presenter(s) : Dr BULYZHENKOV, Igor

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