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Generalized Gauss's Law of Gravity with a Conserved and Re-distributed Field Flux of a Transition to Non-spherical Equipotential Surface

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A gravitational field flux conservation and redistribution picture is proposed with generalizing the Integral Gauss's law of gravity at non-relativistic limit. 1/r dependence along with a disk thickness dependence of gravitational field and the flat rotation curves are obtained by a Gaussian surface with cylindrical symmetry, where most of the gravitational flux lines are assumed to be distributed eventually along the disk plane instead of the spherical distribution of Newtonian gravity.
For disk galaxies, a spherical to cylindrical transition across a critical field strength of the Gaussian surface symmetry is shown to give directly the M ∝ v4 baryonic Tully-Fisher relation. The Faber-Jackson relation of the elliptical galaxies can be explained by an off-spherical symmetry transition for the gravitational flux redistribution.
This transition is assumed to occur spatially between the core and the outskirts of disk galaxies. Such a spatial re-distribution of gravitational flux may give a geometric mapping between the generalized Gaussian surface of the field flux distribution and the real structures in various astronomical scales.
The structural-dynamical relations of disk galaxies revealed by the radial acceleration relation of SPARC data (Spitzer Photometry and Accurate Rotation Curves) have been compared by this mechanism.
The gravitational flux re-distribution transition suggests that the 10^-10 m/s^2 acceleration scale in MOND related studies can equivalently be interpreted as a critical field strength where the transition occurs. This gravitational flux redistribution picture may create a need for a non-Newtonian non-relativistic limit for the General Relativity. The implications of the temporal evolution of the "cylindrical to spherical transition" of the gravitational field flux re-distribution mechanism, including an intrinsic instability of the gravitational field transition, spatial and temporal, is also discussed.

Section

Galaxy/Extragalactic

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