Scale invariance at low accelerations and the mass discrepancies in the Universe

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Galactic systems exhibit large mass discrepancies, the mainstream explanation of which is the evocation of large quantities of “dark matter”, whose nature is not known. The MOND paradigm offers a different solution: a breakdown of standard dynamics in the limit of low accelerations - below some acceleration a0 - such as are found in galactic systems. In this limit, dynamics become space-time scale invariant. With the new dynamics, the various detailed manifestations of the galactic mass discrepancies disappear with no need for exotic dark matter. I will briefly describe the achievements and the remaining desiderata of the paradigm.