

Can MOND explain the data scattering of “big G ” ?

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Contrary to the mainstream opinion that MOND effects cannot be observed in any terrestrial laboratory - as a result of the so-called “external field effect” - I assume here that modifications of the gravitational acceleration a la MOND are determined by the magnitude of the accelerated motion of the pendulum body within the plane of oscillations. This interpretation is consistent with MOND corrections of the inertial mass of the pendulum body or – in context to GR – of the magnitude of the gradient of the curvature of the locally flat space-time within the plane of pendulum oscillations. The numerical analysis of forced oscillations of a pendulum with mixed gravitational and electromagnetic restoring force revealed distinctly different procedures how MOND corrections have to be applied to G values determined by different operational modes of Cavendish experiments, such as static deflection, electric servo, time of swing and angular acceleration feedback. In summary, I found that MOND corrections lead to a significant reduction of data scattering for “big G ” reported from recent Cavendish experiments: A fit of 6 different Cavendish G values reported between 2000 and 2018 (4 different methods, different portions of gravitational and electromagnetic restoring forces) with one fit parameter leads to a consistent “MOND corrected” G value of $6.6742 \cdot 10^{-11} \text{ m}^3\text{kg}^{-1}\text{s}^{-2}$ within a standard deviation of 14 ppm. This was found to be consistent with galaxy rotation curves – at a 100 - 1000 times lower acceleration magnitude in comparison to the Cavendish experiments.