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Newtonian Test of the Standard Model

Isaac Newton's book 'Opticks'from the 18th century includes a number of hypotheses on the structure of matter. Most of the hypotheses were confirmed during the 19th and 20th centuries at the scales of nucleons, nuclei, atoms, molecules and macromolecules. Conflicts appear however at the scale of quarks and gluons according to the Standard Model of particle physics. The confirmations at the larger scales, and the conflicts at the smallest scale, are described and discussed here. Various precursors to the Standard Model for which the conflicts are less severe are also described. These date back to Yukawa's meson model of 1935, and they require substructure in the proton at a fine scale. Observations with electron-proton colliders could clarify the situation.

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