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The quantum-classical boundary and the moments of inertia of physical objects CAROLINE HERZENBERG, Herzenberg Associates — During the last few years, several studies have proposed the existence of a threshold separating classical from quantum behavior of objects that is dependent on the size and mass of an object as well as being dependent on certain basic properties associated with the universe as a whole. We have reexamined the results of these studies and recast the threshold criteria in terms of a critical threshold value for the moments of inertia of physical objects. Physical objects having moments of inertia above this critical threshold value would be expected to behave necessarily in a classical manner as entire objects with respect to their center of mass motion, while physical objects having moments of inertia below this threshold value could exhibit quantum behavior unless brought into classicality by other effects. The derived threshold moment of inertia is given to within a small numerical factor by the ratio of Planck's constant to the Hubble constant. Moments of inertia observed for macroscopic objects are found to exceed this theoretically indicated threshold, while moments of inertia of microscale and mesoscopic scale objects are found to fall below it.

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