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Connecting the muon $g-2$ and proton size anomalies to hadron polarizabilities

CARL CARLSON, College of William and Mary

Hadron polarizabilities matter in a wider context. As examples of this we will discuss how they affect corrections to the muonic hydrogen Lamb shift (crucially relevant to the proton radius problem and by extension to the muon ($g-2$) anomaly), and how they affect calculations of the electromagnetic part of neutron-proton mass difference (the Cottingham formula), where uncertainties in the magnetic polarizability are currently by far the largest source of uncertainty in final result.