Poster Session #A
Laboratory tests of gravitation

A12

Determination of the fine-structure constant with an accuracy of 81 parts per trillion

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Any discrepancies between standard model predictions and experimental results may reveal clues about the new physics. The fine-structure constant alpha is a crucial parameter in quantum electrodynamics theory especially for evaluating the magnetic moment of electron or muon predicted by the standard model. By using a matter-wave interferometer to measure the recoil velocity, we obtained recently a new value of the fine-structure constant with an accuracy of 81 parts per trillion.Using this value of the fine-structure constant we obtain the standard-model prediction of the anomalous magnetic moment of the electron with a relative uncertainty below 0.1 ppt, which is the most accurate prediction of the standard model. This result paves the way for testing the discrepancy observed in the magnetic moment anomaly of the muon in the electron sector.