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Precision Measurements with Matter-wave Interferometry CHRISTOPHER ERICKSON, DAN CHRISTENSEN, MATTHEW WASHBURN, JAMES ARCHIBALD, MARSHALL VAN ZJILL, JEREMIAH BIRRELL, ADAM BURDETT, DALLIN DURFEE, Brigham Young University — We will discuss progress on a neutral-calcium beam interferometer which is nearing completion. We will also present a proposal to measure electric and magnetic fields with extreme precision using a slow ion interferometer. The calcium interferometer utilizes a thermal beam for simplicity and high atom flux. Doppler shifts will be reduced using a novel alignment scheme for the Ramsey beams using precision prisms. The ion interferometer will utilize a slow beam of strontium-87 ions created by photon-ionizing a slow atomic beam. The ions will interact with three sets of laser beams which will drive stimulated Raman transitions. The proposed device will be used to search for variations from Coulomb's inverse-square law and a possible photon rest mass with a precision which is several orders of magnitude better than previous laboratory experiments.

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