

Towards atom interferometry in space for fundamental physics and practical applications

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Matter-wave interferometers have shown great promises for precision measurements in fundamental physics and inertial sensing. Recent advances in laser cooling and manipulation of neutral atoms have brought a new generation of atom-wave interferometers using cold atoms. The cold atom-based atom interferometers can achieve much enhanced performance when operating under the microgravity environment in space. In this presentation, we will briefly review the basic principle of light-pulse atom interferometer and its application as inertial force sensors. We will then discuss some of possible atom interferometer applications in space and potential benefits to NASA missions. Finally, we will overview JPL's efforts in developing atom interferometer gravity gradiometer towards a space-based system.