

**BRIGHT SOURCE OF ATOMS AND IONS FOR QIP AND ULTRACOLD
COLLISION MEASUREMENTS**

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We produce large numbers of low-energy ions by photoionization of laser-cooled atoms inside a surface-electrode-based Paul trap. The isotope-selective trap loading rate of $4e5$ Yb+ ions/s exceeds that attained by photoionization (electron impact ionization) of an atomic beam by four (six) orders of magnitude. Ions at mK temperatures are confined in the same spatial region as laser-cooled atoms, which will allow the experimental investigation of interactions between cold ions and cold atoms.