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Absolute strong-field ionization probabilities of ultracold alkali atoms J. SIMONET, P. WESSELS, B. RUFF, T. KROKER, Centre for Ultrafast Imaging, University of Hamburg, A. K. KAZANSKY, Ikerbasque, Basque Foundation for Science, N. M. KABACHNIK, Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University, K. SENGSTOCK, M. DRESCHER, Centre for Ultrafast Imaging, University of Hamburg — We report on precise measurements of absolute non-linear ionization probabilities obtained by exposing ultracold ^{87}Rb atoms to the field of an ultrashort laser pulse. We have investigated both, the non-resonant and resonant strong-field response in the demanding transitional regime where the Keldysh parameter is near unity and thus *ab-initio* theory, based on solving the time-dependent Schrödinger equation (TDSE), is required. Employing optically trapped ultracold atomic gases indeed allows retrieving absolute ionization yields since the target density is recorded simultaneously to the ionized atoms, seen as spatially resolved losses. The accurate data sets are in perfect agreement with ionization probabilities obtained by numerically solving the TDSE without any free parameters. The single outer-shell electron and the low ionization potential combined with a high polarizability compared to commonly used rare gas atoms make alkali atoms ideal model systems for studying strong-field physics.

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