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The interaction of excited atoms and few-cycle laser pulses[1]
JAMES CALVERT, HAN XU, ADAM PALMER, DANE LABAN, IGOR LITVINYUK, DAVID KIELPINKSI, ROBERT SANG, Australian Attosecond Science Facility and Centre for Quantum Dynamics, Griffith University, ROHAN GLOVER, University of Liege, Belgium, XIAO-MIN TONG, University of Tsukuba, Japan, VALERIY DOLMATOV, University of North Alabama, ANATOLI KHEIFETS, Australian National University, KLAUS BARTSCHAT, Drake University — We present the observations of the ionisation of neon in a metastable atomic state utilising a strong-field fewcycle laser pulse [1,2]. We compare the observations to theoretical predictions based on the Ammosov-Delone-Krainov (ADK) theory [3] and a solution to the time-dependent Schrödinger equation (TDSE) [4]. The TDSE provides better agreement with the experimental data than the ADK theory. We optically pump the target atomic species and demonstrate that the ionisation rate depends on the spin state of the target atoms and provide physically transparent interpretation of such a spin dependence in the frameworks of the spin-polarised Hartree-Fock and random-phase approximations [5]. [1] J. E. Calvert *et al.*, arXiv:1601.03786, 2016, Sci. Rep. submitted [2] I. A. Ivanov, Sci. Rep. 19002 (2016) [3] M. V. Ammosov *et al.*, Sov. Phys. JETP 64, 425 (1986). [4] X. M. Tong *et al.*, Phys. Rev. A 74, 031405(R) (2006). [5] M. Y. Amus'ya *et al.*, Sov. Phys. . JETP 58, 67 (1983).

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