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Relativistic nuclear recoil, electron correlation and QED effects in highly charged Ar ions Z. HARMAN, R. SORIA ORTS, A. LAPIERRE, J.R. CRESPO LOPEZ-URRUTIA, A.N. ARTEMYEV, I.I. TUPITSYN, U.D. JENTSCHURA, C.H. KEITEL, H. TAWARA, J. ULLRICH, Max Planck Institute for Nuclear Physics, Heidelberg, Germany, V.M. SHABAEV, A.V. VOLOTKA, St. Petersburg State University, Russia — We have performed extensive theoretical studies on the $1s^2 2s^2 2p^2 P_{3/2}$ – $^2P_{1/2}$ M1 transition in Ar^{13+} ions. Accurate radiative lifetimes are sensitive to QED corrections like the electron anomalous magnetic moment and to relativistic electron correlation effects. The lifetime of the $P_{3/2}$ metastable state was determined to be 9.573(4)(5) ms (stat)(syst) [1] using the Heidelberg electron beam ion trap. Theoretical predictions cluster around a value that is significantly shorter than this high-precision experimental result. This discrepancy is presently unexplained. The wavelengths of the above transition in Ar^{13+} and the $1s^2 2s2p\ ^3P_1$ – $^3P_2$ M1 transition in Ar^{14+} were compared for the isotopes ^{36}Ar and ^{40}Ar [2]. The observed mass shift has confirmed the relativistic theory of nuclear recoil effects in many-body systems. Our calculations, based on the fully relativistic recoil operator, are in excellent agreement with the measured results. [1] A. Lapierre, U.D. Jentschura, J.R. Crespo López-Urrutia *et al.*, Phys. Rev. Lett. 95, 183001 (2005); [2] R. Soria Orts, Z. Harman, J.R. Crespo López-Urrutia *et al.*, Phys. Rev. Lett. 97, 103002 (2006)

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