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Theoretical study on one- and two-electron processes involving capture in ion-Helium collisions TOM KIRCHNER, MYROSLAV ZAPUKHLYAK, Institut fuer Theoretische Physik der TU Clausthal — Motivated by recent efforts to disentangle the effects of heavy-particle-electron couplings and electron-electron interactions on differential cross sections in ion-atom collisions [1,2] we have carried out a rather comprehensive theoretical study on various one- and two-electron processes that include capture over a broad range of impact energies. The calculations are based on the independent electron model, the two-center basis generator method for orbital propagation, and the eikonal approximation to extract angular-differential cross sections from impact-parameter-dependent transition amplitudes. Selected results for proton, He^{2+}, and $Ar^{15+...18+}$impact on helium atoms will be presented and compared with experimental and previous theoretical data where available. In general, good agreement with measurements is found, even for shell-specific capture in highly-charged argon impact collisions, for which close-coupling calculations are very demanding. The status of theory will be assessed and future directions will be pointed out. [1] A. Hasan et al., Phys. Rev. A **74**, 032703 (2006) [2] M. Zapukhlyak, et al., Phys. Rev. A **77**, 012720 (2007)

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