Strong-field ionization of one-electron relativistic diatomic quasimolecules[1] DMITRY A. TELNOV, DMITRY A. KRAPIVIN, St. Petersburg State University, Russia, JOHN HESLAR, National Taiwan University, Taiwan, SHIH-I CHU, University of Kansas, USA — We perform a theoretical and computational study of relativistic one-electron homonuclear diatomic quasimolecules subject to strong electromagnetic fields linearly polarized along the molecular axis. The time-dependent Dirac equation is solved with the help of the generalized pseudospectral method in prolate spheroidal coordinates. We have found that the corresponding eigenvalue problem, solved with this method and numerical parameters used in our calculations, does not generate spurious states, at least among low-lying bound states. Relativistic and nondipole effects in ionization probabilities are analyzed for a set of quasimolecules with the nuclear charges 1 to 92 and appropriately scaled internuclear distances and field parameters (with such a scaling, nonrelativistic treatment returns identical results for all the quasimolecules in the set). Because of the relativistic transformation of the electronic structure, resonantly enhanced multiphoton ionization of different quasimolecules is actually observed at different scaled internuclear distances. Nondipole corrections to the ionization probability grow with increasing nuclear charge in the set of scaled quasimolecules.

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