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Orientation-dependent ionization yields from strong-field ionization of fixed-in-space linear and asymmetric top molecules J.L. HANSEN, iNANO, Aarhus University, 8000 Aarhus C, Denmark, D. DIMITROVSKI, L.B. MADSEN, Department of Physics and Astronomy, Aarhus University, 8000 Aarhus C, Denmark, H. STAPELFELDT, Department of Chemistry, Aarhus University, 8000 Aarhus C, Denmark — The ionization step leading to single ionization in the multiphoton or tunnel ionization regime is a fundamental process which is thought to be well understood for atoms; however, for larger molecules much less is known. Of particular importance is the understanding of the dependence of the initial ionization step on the molecular orientation with respect to the external field. To fully test existing theories and to guide the way for new theory development, we here extend these experiments to larger and more complex molecular systems: Carbonyl sulphide (OCS), benzonitrile and naphthalene. In particular we investigate the yield of strong-field ionization, by a linearly polarized probe pulse, as a function of the relative orientation between the laser field and the molecule. This is achieved using standard laser alignment techniques to produce 1D or 3D aligned molecular ensembles before a femtosecond laser probe pulse singly ionizes the target molecules. For naphthalene and benzonitrile, the orientational dependence of the ionization yield agrees well with the calculated results, in particular, we observe that ionization is maximized when the probe laser is polarized along the most polarizable axis. For OCS the observation of the maximum ionization yield when the probe is perpendicular to the internuclear axis contrasts the theoretical results.

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