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Non-Resonant Ionization and Fragmentation Pathways in Na_2.[1]
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With the help of molecular beam, time-of-flight (TOF) mass spectrometer, and Nd:YAG laser we have investigated multi-photon ionization and dissociation patterns of Na_2 molecules. One prominent feature of TOF spectra obtained with 532nm photons can be assigned to 3-photon ionization followed by 1-photon dissociation. This channel yields Na^+ fragments with kinetic energy of about 0.67eV, the highest kinetic energy release we found for any combination of YAG photons (1064, 532, and 355nm). In the same TOF spectra, we also observe features consistent with 2-photon dissociative excitation followed by 1-photon ionization of electronically excited Na fragments (4s, 3d, 4p). No other YAG photons produce such fragments. Finally, a broad fragment peak corresponding to low kinetic energy release is observed at all YAG wavelengths, though with subtly different line shapes. Various combinations of 532nm with other YAG photons reveal significant enhancements in some channels but not in others. We have systematically explored this behavior together with polarization and power dependence. Results of a realistic modeling based analysis of these spectra will be presented. Details of modeling and experimental approach may be found in a previous publication[1]. – [1]B. Delahunty et al., Phys. Rev. A **60**, 1179 (1999)

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