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Optical imaging of molecular rotational wave packets ILIA TUTUNNIKOV, Weizmann Institute of Science, Rehovot, Israel, JÉRÉMY BERT, EMILIEN PROST, PIERRE BÉJOT, EDOUARD HERTZ, FRANCK BILLARD, BRUNO LAVOREL, Laboratoire Interdisciplinaire CARNOT de Bourgogne, UMR 6303 CNRS-Université de Bourgogne Franche-Comté, Dijon, France, URI STEINITZ, Soreq Nuclear Research Centre, Yavne, Israel, ILYA AVERBUKH, Weizmann Institute of Science, Rehovot, Israel, OLIVIER FAUCHER, Laboratoire Interdisciplinaire CARNOT de Bourgogne, UMR 6303 CNRS-Université de Bourgogne Franche-Comté, Dijon, France — Short laser pulses are widely used for controlling molecular rotational degrees of freedom and inducing molecular alignment, orientation, unidirectional rotation, and other types of coherent rotational motion. The present work offers and demonstrates a novel non-destructive optical method for direct visualization and recording of movies of coherent rotational dynamics in a molecular gas [1]. The technique is based on imaging the time-dependent polarization dynamics of a probe light propagating through a gas of coherently rotating molecules. The probe pulse continues through a radial polarizer, and is then recorded by a camera. We illustrate the technique by implementing it with two examples of time-resolved rotational dynamics: alignment-antialignment cycles in a molecular gas excited by a single linearly polarized laser pulse and unidirectional molecular rotation induced by a pulse with twisted polarization. This method may open new avenues in studies on fast chemical transformation phenomena and ultrafast molecular dynamics caused by strong laser fields of various complexities. [1] arXiv:1912.03045 [physics.optics], 2019

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