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Laser induced persistent orientation of chiral molecules: experiment and theory ILIA TUTUNNIKOV, The Weizmann Institute of Science, Rehovot, Israel, JOHANESS FLOSS, Department of Chemistry, University of Toronto, Canada, EREZ GERSHNABEL, The Weizmann Institute of Science, Rehovot, Israel, PAUL BRUMER, Department of Chemistry, University of Toronto, Canada, ILYA AVERBUKH, The Weizmann Institute of Science, Rehovot, Israel, ALEXANDER MILNER, VALERY MILNER, Department of Physics Astronomy, The University of British Columbia, Vancouver, Canada — Molecular chirality is an omnipresent phenomenon of fundamental significance in physics, chemistry and biology. For this reason, search for novel techniques for enantioselective control, detection and separation of chiral molecules is of particular importance. It has been recently predicted [1] that laser fields with twisted polarization may induce persistent enantioselective field-free orientation of chiral molecules. Here we report the first experimental observation of this phenomenon [2] using propylene oxide molecules (CH_3CHCH_2O, or PPO) spun by an optical centrifuge - a laser pulse, whose linear polarization undergoes an accelerated rotation around its propagation direction. We show that PPO molecules remain oriented on a time scale exceeding the duration of the centrifuge pulse by several orders of magnitude. The demonstrated long-time field-free enantioselective orientation opens new avenues for optical manipulation, discrimination, and, potentially, separation of molecular enantiomers.
[1] Phys. Rev. A **100**, 043406 (2019) [2] arXiv:1907.13332 [physics.chem-ph]

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