

Abstract Submitted
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Coherent control of quantum dynamics in laser kicked molecular rotors MARTIN BITTER, VALERY MILNER, University of British Columbia — We investigate experimentally the dynamics of true quantum kicked rotors - oxygen and nitrogen molecules subject to a sequence of more than 20 ultrashort laser pulses with peak intensities exceeding 10^{13} W/cm² per pulse. Using state-resolved rotational Raman spectroscopy, we show that the centrifugal distortion is the main obstacle in reaching high rotational states, as it results in the coherent oscillations of rotational population similar to Bloch oscillations in condensed matter. We demonstrate that the timing of the individual pulses can be optimized to partially mitigate the centrifugal limit and produce broader rotational wave packets with higher degrees of rotational coherence. Progress towards the experimental observation of Anderson localization in laser-kicked molecular rotors will be discussed.

Martin Bitter
University of British Columbia

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