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Probing vacuum-induced coherence via magneto-optical rotation in molecular systems PARDEEP KUMAR, Department of Physics, Indian Institute of Technology Ropar, BIMALENDU DEB, Department of Material Science and Raman Center for Atomic, Molecular and Optical Sciences, IACS, Jadavpur,Kolkata,India, SHUBHRANGSHU DASGUPTA, Department of Physics, Indian Institute of Technology Ropar — Vacuum-induced coherence (VIC) arises due to the quantum interference between the spontaneous emission pathways from the degenerate excited states to a common ground state. The stringent requirement for the VIC to occur is the nonorthogonality of the transition dipole matrix elements. Unlike atoms, molecules are the promising systems for exploration of VIC, as it is possible to identify the non-orthogonal transitions due to the coupling of the rotation of molecular axis with molecular electronic angular momentum. Usually, the possible signatures of VIC are obtained by manipulating the *absorption* of the probe field. In this paper, we show how the *dispersion* of the probe field can be manipulated to obtain a measurable signature of VIC. Precisely speaking, we explore a way to probe VIC in molecules by observing its influence on magneto-optical rotation (MOR). We show that VIC in the presence of a control laser and a magnetic field can lead to large enhancement in the rotation of the plane of polarization of a linearly polarized weak laser with vanishing circular dichroism. This effect can be realized in cold molecular gases. Such a large MOR angle may be used as a tool for optical magnetometry to detect weak magnetic field with large measurement sensitivity.

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