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Relationship Between Differential Interference Angle and Parameter of Experiment in Molecular Beam

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Abstract: Collisional quantum interference (CQI) was observed in the intramolecular rotational energy transfer in the experiment of the static cell, and the integral interference angles were measured. To observe more precise information, the experiment in the molecular beam should be taken, from which the relationship between the differential interference angle and the scattering angle can be obtained. In this paper, the theoretical model of CQI is described in an atom-diatom system in the condition of the molecular beam, based on the first-Born approximation of time-dependent perturbation theory, taking into accounts the long-range interaction potential. The method of observing and measuring correctly the differential interference angle is presented. The changing tendency of the differential interference angle with the impact parameter and relative velocity is discussed. The changing tendencies of the differential interference angle with the parameter of experiment in the molecular beam, including the impact parameter and the velocity are discussed. This theoretical model is important to understand or perform the experiment in the molecular beam.

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Key words: differential interference angle, quantum interference, rotational energy transfer

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