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Coherent dynamics of small molecules in rare gas crystals

By Markus Gühr

Cuvillier Verlag Mrz 2005, 2005. Taschenbuch. Book Condition: Neu. 211x144x15 mm. Neuware - The book presents a systematic study of coherent phenomena in molecule doped rare gas crystals, exemplified on bromine and iodine molecules in solid argon and krypton. Ultrashort laser pulses are applied to prepare vibrational wave packets on the molecules. Their dynamics is investigated via the pump-probe method. The principles of classical and quantum mechanical coherence are introduced in the first chapters together with the concepts of wave packet focusing and fractional revivals. Those are used to deduce the vibrational and electronic decoherence of molecular wave packets in the rare gas host. A novel coherent control scheme based on chirped laser pulse excitation is worked out to manipulate the wave packets. Furthermore, the molecular energy relaxation and the rotational behaviour in the rare gas host are discussed. Apart from the molecular wave packets, coherent phonons of the rare gas crystal are investigated via the pump-probe spectroscopy on the molecule. Those phonons are excited impulsively in a molecular electronic transition and modulate the host density close to the molecule. Due to the special probe situation, only coherent zone boundary phonons show up in the transients. 178 pp. Deutsch.



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