

# **Dynamics of X-Ray Raman Scattering**

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Some recent advances in the theory of the resonant x-ray (RXS) Raman process for molecules and solids involving inner shell electrons are reviewed. Special emphasis is put on the dynamical aspects of nuclear and electronic degrees of freedom and on the notion of the duration time for RXS. The temporal theory for the nuclear degrees of freedom is based on a wave packet formalism and for the electrons on a novel time-dependent technique based on the Keldysh-Dyson formalism. The classification of the different interference contributions in molecules and solids is given together with an analysis of the dephasing of the interfering channels. Different physical aspects of RXS are discussed using comparison with available experimental data.