SEMINAIRE ISMO (LCAM - LIXAM – LPPM)

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Control of ionization and dissociation by optical pulse trains

Complex resonances in atomic and molecular spectra lead to elaborate transfer of energy, momentum and angular momentum. Some of the earliest observations of such resonances were made in the spectra of autoionizing atoms in the 1960s and since then, both theory and experiment have made slow but steady progress to describe and observe these phenomena. I will present calculations of the spectra and the dynamics associated with a complex resonance, which couples a range of vibrational, rotational and electronic states to ionization and dissociation in the H_2 molecule. The calculations, based on Multi-channel Quantum Defect Theory (MQDT), reproduce experimental spectra with high accuracy and provide a detailed picture of energy flow in real time. Using this accurate model, we demonstrate how wave packet interferometry, which relies on the interference of molecular wave packets excited by a sequence of carefully tuned laser pulses, can change the ratio of ionization to dissociation by more than a factor of ten.

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