The interaction of atoms, molecules, crystals and nanotubes with time-periodic laser fields can lead to various space-time symmetries. These space-time symmetries [also referred to as dynamical symmetries (DS's)] are to the Floquet Hamiltonian what spatial symmetries are to the field-free Hamiltonian. Consequently, DS-based properties of Floquet states and moreover physical phenomena in time-periodic laser fields can be studied and described by group theoretical methods.
In the first part of this talk we will present some aspects of the theory of DS.
In particular, the modification of electronic energy-bands in crystals induced by circularly-polarized electromagnetic fields (assigning of quantum numbers and non-accidental degeneracies) and the reduction of the computational effort for integrating the time-evolution operator associated with the presence of DS's will be presented.
Furthermore, it will be shown in the second part of the talk that DS's underlie the formulation of selection rules for harmonic and directed-current
generation processes in strong laser fields.
This enables one to predict, control and engineer output of relevant experiments.
By doing so, DS analysis of harmonic and directed-current generation is placed on a firm foundation, analogously to that possessed by symmetry analysis in ``conventional'' spectroscopy.

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