

21th November 2013 – 10:00 a.m.
 CFEL-bldg. 99, seminar room I and II (EG.076/078)

Bretislav Friedrich

Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin

Shedding far-off resonant light on polar paramagnetic molecules

A far-off resonant optical field hybridizes the rotational states of an anisotropic molecule and aligns the axis of the molecule along the field's polarization vector. The hybrid states occur as tunneling doublets of opposite parity whose splitting can be arbitrarily diminished by raising the intensity of the optical field. For polar molecules, such quasi-degenerate doublet states can be efficiently coupled either by the electric dipole interaction with a superimposed electrostatic field or by the electric dipole-dipole interaction arising between a pair of polar molecules. For molecules that are paramagnetic apart from being polar, a superimposed magnetic field causes a further parity-conserving hybridization of the molecule's rotational states. Such hybridization doubles the number of the tunneling doublets by splitting states that differ in the sign of the projection of the angular momentum on the common direction of the optical, electric, and magnetic fields. I will discuss molecules subject to the double- and triple-field combinations and the repercussions these interactions have for molecular orientation, tuning of intermolecular potentials, and quantum computing.

