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back to namelist

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## Towards interference enhanced metrology on biomolecules

Matter-wave interferometry has proved to be a powerful and precise tool for the study of quantum properties of molecules (Berninger et. al. PRA 76, 2007, Eibenberger et. al., PRL 112, 2014). It has been demonstrated for up to 10.000 amu in our setup (Eibenberger et. al. Phys.Chem. Chem. Phys., 15, 2013). As the amplitude as well as the phase of the fringe pattern is extremely sensitive to external forces matter-wave interference can enhance the spatial resolution of deflection measurements by a factor of 10e4 compared to classic ballistic deflectometry. This has been successfully conducted for electric deflection (Eibenberger, NJP 13, 2011) which allowed us to measure static polarizabilities und the temperature-dependence of permanent dipole moments.
Thus matter-wave interferometry enhanced deflectometry makes high precision measurements on complex biomolecules feasible. The determination of their magnetic, electric and optical properties allows the investigation of their structure and of photo-induced conformational changes as well as photochemistry in the gas phase. Additional water-bonds mimic the molecule´s natural environment and allow to study the transition from the gas-phase to the in-vivo-behaviour. We will present a geometry for deflection in magnetic fields suitable for interferometry which requires a homogenous force over the extension of the beam. Furthermore we will introduce a source for beams of internally cold, neutral and intact biomolecules up to 4000 amu that are sufficiently slow and intense for interference experiments. Finally we will report on recent progress in the research on biomolecules.

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