We plan to investigate the dynamics of aerosol particles in optical traps. We use Finite Difference Time Domain (FDTD) methods and related codes for the simulation of submicron particles under laser irradiation in one- and two-beam configurations resulting in optical trapping and binding of the particles in air [1,2]. So far relatively few investigations have been reported on the motion of aerosol particles in optical traps and we plan to study the translational and rotational motion of non-spherical aerosol droplets due to the force and torque exerted on the trapped particle by two counter-propagating laser beams. We plan to investigate the influence of the beam polarizations, laser frequency and light absorption by the particle on its translational and rotational motion in the trap. Furthermore, we hope to learn more about the coupling between the translational and rotational degrees of freedom of optically trapped aerosol particles. Our theoretical investigations are complementary to recent experimental investigations [3-5] in the group of Prof. Signorell, aiming to enhance the understanding of the observed dynamics of optically trapped aerosol particles.

The project is of general fundamental relevance to the physical and chemical properties of aerosol particles and the role of such particles in atmospheric chemical physics, as well as their environmental impact [6,7].

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