# Dynamics of an inhomogeneously heated Brownian particle in a harmonic trap

**Sametov E.A.**[1,@] **and Lisin E.A.**[1]

[1] Joint Institute for High Temperatures of the Russian Academy of Sciences, Izhorskaya 13 Bldg 2, Moscow, 125412, Russia

[@] sametov@phystech.su

A mathematical model is developed to describe the dynamics of active Brownian particles in rarefied gases and complex plasmas. The model takes into account the main features: the presence of an active force associated with non-uniform heating of the particle surface, translational and rotational inertia, inhomogeneous distribution of the particle mass due to the presence of a light-absorbing coating on one of the halves of the particle. A numerical simulation of the dynamics of an active Brownian particle with center of mass displacement in the confinement force field of the trap is performed. The obtained particle trajectories correspond to those observed in real experiments with Janus particles. A comparison of the results at different ratios of the particle surface temperature and a comparison of the dynamics of a particle with unshifted and shifted center of mass are performed. A significant influence of the inhomogeneous heating of the surface on the motion character of an active Brownian particle in the free-molecular regime in the presence of a confining force field of the trap is obtained.

This work was supported by the Russian Science Foundation under grant No. 24-12-00345.