# Experimental study of nonreciprocity-induced heating in a gas discharge plasma

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A system of micron-sized particles trapped in a plasma with an ionic flow is an example of the so-called "breaking" of the interaction symmetry. Such a formal non-fulfillment of Newton's third law arises when considering a subsystem of particles in a medium, while the medium itself is taken into account indirectly—through the potential of interparticle interaction, dissipative forces, and also as a source of the kinetic energy of particles. The nonreciprocal type of interaction between dust particles can be the cause of the "anomalous heating" of particles, when microparticles have a higher kinetic energy compared to the temperatures of the neutral, ionic and electronic subsystems.

This report presents an experimental study of the nonreciprocal effective interaction between microparticles suspended in DC gas discharge and the resulting kinetic heating. For this purpose, the data were analyzed using a new experimental method [1] based on the analysis of the spectral density of random processes. It was obtained that in the entire range of discharge parameters, the effective interaction between particles is nonreciprocal. It was shown that the dominant mechanism for heating dust particles in gas discharges is the work of effective forces of interparticle interaction.

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