Recently, quite a few studies have appeared on the so-called “violation” of the interaction symmetry. Such a formal failure to comply with Newton’s third law may arise, for example, when a particle subsystem in a medium is considered while the medium itself is indirectly taken into account through the potential of interparticle interaction, dissipative forces or as a source of particle kinetic energy. A striking example of such systems are some types of soft matter e.g., flowing colloidal suspensions, active colloids and gas-discharge complex (dusty) plasmas where the geometry of interactions between particles plays a key role in the processes of self-organization, self-assembly, transfer and redistribution of energy, and nonequilibrium phase transitions. In addition to the fundamental physics that can be examined, the study of these systems is also of particular interest for nano- and micro-technological applications.

To study this phenomenon, an experimental method based on an analysis of the spectral density of random processes in an open dissipative two-particle system was developed. In contrast to previous investigations, the proposed method takes into account random and dissipative processes in the system, does not require a special design of the experimental setup and any external perturbations, pre-measurements of external fields and any assumptions about the type of interaction.

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