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MARCH 1-6 2020
ELBRUS
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The book consists of abstracts of plenary lectures, oral reports and posters presented at the XXXV International Conference on Equations of State for Matter (1–6 March 2020, Elbrus, Kabardino-Balkaria, Russia). The presentations deal with the contemporary investigations in the field of physics of extreme states of matter. The conference topics are as follows: equations of state and constitutive equations for matter under extreme conditions at high pressures and temperatures; shock waves, detonation and combustion physics; interaction of intense laser, x-ray and microwave radiation, powerful particle beams with matter; experimental techniques of generation and diagnostics of extreme states of matter; methods of mathematical modeling in physics of extreme states of matter; high-energy astrophysics; physics of low-temperature and non-ideal plasma; physical issues of power engineering and technology aspects.

The conference is supported by the Russian Academy of Sciences as well as the Kabardino-Balkar Scientific Center of the Russian Academy of Sciences.

The editorial board with deep regret announces the death of friends and colleagues: Professor Vladimir Ivanovich Molotkov (17 March 1941 – 11 July 2019); Corresponding Member of the Russian Academy of Sciences, Professor Sergey Ivanovich Anisimov (11 December 1934 – 15 October 2019); Doctor Vyacheslav Aleksandrovich Petukhov (6 February 1940 – 26 November 2019); Professor Alexander Borisovich Shvartsburg (26 January 1937 – 15 February 2020). All of them were active participants in the Conferences on Equations of State for Matter and Interaction of Intense Energy Fluxes with Matter.

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Collective particle dynamics in one-component Yukawa liquid: Self-consistent relaxation theory

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A one-component plasma is the most suitable multiparticle system for the development of the microscopic theory of liquids. This is mainly due to the specific potential of interparticle interaction, as well as due to available experimental data and the results of molecular dynamics simulations, which can be used to verify the correctness of theoretical conclusions. In this work, we will present the microscopic theory of the collective dynamics of particles (ions) of a single-component plasma, where only the interaction potential—the Yukawa potential—and the structural characteristics—the particle pair distribution function and the structure factor—are used as input parameters. It will be shown that the microscopic theory is realized on a wide range of wave vectors; it generalizes the hydrodynamic theory and reproduces the known hydrodynamic expressions in the long-wavelength limit. The theory correctly reproduces all the known features of the spectra of the dynamic structure factor for a wide range of wave numbers, as well as the dispersion law of acoustic-like collective excitations. The theoretical results obtained are compared with the results of known theoretical models and approaches. This work was supported by the Russian Foundation for Basic Research (project No. 18-02-00407).