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On Crystallization in Two-Component Quantum Coulomb Plasma VLADIMIR FILINOV, PAVEL LEVASHOV, VLADIMIR FORTOV, JIHT RAS, Moscow, Russia, MICHAEL BONITZ, Universitat zu Kiel, Germany, HOLGER FEHSKE, Universitat Greifswald, Germany — In this work we present the results of simulation of two-component fully-quantum Coulomb systems by Direct Path Integral Monte Carlo method. Our calculations show that at significantly high densities the fraction of bound states diminishes, and a crystallization can occur in the simulation box. This phenomenon exists at relatively low temperatures in the limited range of densites and at heavy-light particle mass ratio higher than 80 in 3D case. The crystal consists of heavy particles on the background of highly degenerate light particles; at certain conditions the heavy particle can form anti-ferromagnetic crystal-like structure. The crystal melts at temperature increase (the Lindemann criterion is valid in this case) and heavy-light particle mass ratio decrease (quantum melting). Our simulations generalize the earlier results for one-component plasma and can be applied to a number of problems: semiconductors under pressure, Coulomb crystals in white dwarfs and neutron stars, ion crystals in traps etc. Coulomb crystallization is also considered to be related to the high-temperature superconductivity. This work is supported by the CRDF and the Ministry of Education of Russian Federation Grant No.Y2-P-11-02.

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