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Nonlinear waves and inelastic effects in complex plasmas DMITRY SAMSONOV, CELINE DURNIAK, PAUL HARVEY, EDWARD HALL, NEIL OXTOBY, JASON RALPH, The University of Liverpool, SERGEY ZHDANOV, CHRISTINA KNAPEK, GREGOR MORFILL, Max-Planck-Institute for Extraterrestrial Physics — Complex (dusty) plasmas are mixtures of micron-sized spheres with ion-electron plasmas. These spheres collect ions and electrons and acquire large negative electric charges. Due to collective interaction, they form crystal- or liquid-like structures. These structures can propagate linear and nonlinear waves such as solitons, and exhibit phase transitions. Our experiments were performed in a radio-frequency capacitively coupled gas discharge. Plastic microspheres were introduced into the plasma where they levitated above a powered electrode. A monolayer hexagonal lattice was formed, which was excited by applying electrostatic pulses. A series of experiments were performed in order to study soliton propagation in an inhomogeneous lattice, interaction of two counter-propagating solitons, as well as the influence of deformations on the crystal structure. The experiments were compared with molecular dynamics simulations based on the 5-th order Runge-Kutta solver of the equations of motion.

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