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Experimental study of interacting solitons in a complex (dusty) plasma¹ PAUL HARVEY, DMITRY SAMSONOV, University of Liverpool, GREGOR MORFILL, Max Planck Institute of Extraterrestrial Physics — A plasma is an ionised gas which consists of a mixture of electrons, positive ions and neutral molecules. In complex plasmas, small micron-sized microspheres are introduced. The grains become negatively charged and form a monolayer lattice. A soliton is a stable, solitary wave that retains its shape as it propagates through a medium. The apparatus for this experiment consists of a discharge chamber containing two electrodes. The lower electrode delivers RF-power into the chamber, maintaining the argon gas in the plasma state. The particles are confined radially within a bowl-shaped potential. Two parallel wires run along opposite sides of the monolayer lattice. A negative pulse on both wires excites two solitons to propagate inwards. A thin sheet of laser light illuminates the lattice which is then captured on video at a high frame rate. The kinetic movement of the microspheres can then be analysed. The propagation of the two solitons through this crystal lattice has been traced. Interaction has been observed to occur between two soliton waves within the complex plasma.

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Paul Harvey
University of Liverpool

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