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Nonlinear Structures in Very Dense Plasmas PADMA KANT SHUKLA, Theoretical Physics IV, Ruhr-University Bochum, D-44780, Bochum, Germany, BENGT ELIASSON, Theoretical Physics IV, Ruhr-University Bochum, D-44780 Bochum, Germany — We present numerical studies of the formation and dynamics of dark solitons and vortices in very dense quantum electron plasmas. The electron dynamics in the latter is governed by a pair of equations comprising the nonlinear Schrödinger and Poisson system of equations, which conserves the number of electrons as well as their momentum and energy. The present governing equations in one spatial dimension admit stationary solutions in the form a dark envelope soliton. The dynamics of the latter reveals its robustness. Furthermore, we numerically demonstrate the existence of cylindrically symmetric two-dimensional quantum electron vortices, which survive during collisions by forming vortex pairs. The nonlinear structures presented here may serve the purpose of transporting information at quantum scales in ultracold micromechanical systems and dense plasmas, such as those created during intense laser-matter interactions.

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