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Topological textures and metal-insulator transition in Reentrant Integer Quantum Hall Effect: role of disorder[1] YULI LYANDA-GELLER, GEORGE SIMION, Department of Physics and Astronomy, Purdue University, West Lafayette, IN 47907 USA — We investigate a ground state of the two-dimensional (2D) electron liquid in the presence of disorder for Landau level filling factors, for which the re-entrant integer quantum Hall effect is observed. Our particular interest is the range of filling factors, which in a clean 2D system is favorable to formation of the two-electron (2e) bubble crystal. For the smooth random potential due to charged impurities placed far away from the 2D gas, the ground state is a lightly distorted 2e bubble crystal. However, for positively or negatively charged residual impurities located approximately within about three magnetic lengths from the 2D electrons, the ground state contains charged 2e complexes formed either by positively charged impurity and 3e defect bubble, or negatively charged impurity and 2e defect bubble. In the vicinity of 1e and 3e defect bubbles, the 2e bubbles of the crystal change their shape from round to elongated forming hedgehog (for 1e defect) or vortex (for 3e defect) textures. The topological textures due to these complexes interact with vortex and hedgehog excitations, generated as temperature increases that are not bound by residual impurities. The temperature of insulator to metal transition calculated with both bound and unbound defects agrees with experiment.

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