

Abstract Submitted
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Observation of superfluid components in solid ^4He ¹ HANS LAUTER, SNS-ORNL, ECKHARD KROTSCHKE, University at Buffalo SUNY Buffalo, EFIM KATS, Institut Laue Langevin France, ALEXANDER PUCHKOV, IPPE Obninsk Russia, VALERIA LAUTER, SNS-ORNL, VESA APAJA, University of Jyvaeskylae Finland, IVAN KALININ, IPPE Obninsk Russia, MAREK KOZA, Institut Laue Langevin France — Neutron scattering demonstrated that localized superfluid components exist at high pressure within solid helium in aerogel [1]. Two sharp phonon-roton spectra are clearly distinguishable from modes in bulk superfluid helium. These roton excitations exhibit different roton gap parameters than the roton observed in the bulk fluid at freezing pressure. One of the roton modes disappears after annealing. Comparison with theoretical calculations suggests that the model that reproduces the observed data best is that of superfluid double layers within the solid and at the helium-substrate interface. The elastic scattering evidenced in addition to the hcp phase also the bcc-phase. both consisting of a small crystallites as a consequence of the confinement. The structural aspect of coexisting hcp and bcc phases in the aerogel matrix seems to be important for the creation of the localized superfluid components.

[1] H. Lauter, E. Krotscheck, E. Kats, A. V. Puchkov, V. V. Lauter, V. Apaja, I. Kalinin, M. Koza, PRL submitted

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