

Abstract Submitted
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Photon-Roton Modes in Liquid ^4He coexist with Bose-Einstein Condensation HENRY R. GLYDE, Department of Physics and Astronomy, University of Delaware, JACQUES BOSSY, Institut Neel, CNRS-UJF, BP 166, 38042 Grenoble Cedex 9, France, JACQUES OLLIVIER, Institut Laue-Langevin, BP 156, 38042 Grenoble, France, HELMUT SCHOBER, Institut Laue-Langevin, BP 156, 38042 Grenoble, France, Universite Joseph Fourier, UFR de Physique, F38041 Grenoble Cedex 9, France — We present neutron scattering measurements of the phonon-roton (P-R) and layer modes of liquid ^4He confined in MCM-41 under pressure up to 38 bar. The data shows unambiguously that the P-R mode exists at low temperature only. As temperature is increased there is a gradual transfer of intensity from the P-R mode to the normal liquid response, which lies at a lower energy at higher pressure. The transfer takes place with no observable mode broadening. The loss of P-R modes is identified with the loss of Bose-Einstein condensation (BEC). The mode giving rise to the specific heat, c_V , of liquid ^4He in porous media (e.g. gelsil) at higher temperature is the layer mode since the energy of the mode extracted from c_V and the layer mode energy are the same.

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