Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Acoustic crystallization[1] SEBASTIEN BALIBAR, RYOSUKE ISHIGURO, FREDERIC CAUPIN[2], ENS-Paris — By focusing high intensity acoustic waves in the middle of a liquid, it is possible to pressurize it far beyond its solid-liquid equilibrium pressure. This is because, in the absence of walls or defects, the nucleation of crystals needs to be "homogeneous", and that the threshold pressure for this phenomenon is usually very high. In a classical liquid, the viscosity increases with pressure so that the dynamics blocks as the pressure is increased and a transition to a glassy state occurs. However, we did not expect this to occur in a superfluid, and we looked for acoustic crystallization in liquid helium. We have found evidence that an acoustic wave travelling in superfluid helium can indeed crystallize this liquid on its path. We relate this phenomenon to the existence of an instability where Landau's "rotons" become soft modes. We discuss further developments of this experiment in relation with the existence of superfluidity in a very dense liquid.

[1]RI acknowledges support from the JSPS
[2]associated with CNRS and Universities Paris 6 and 7

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Date submitted: 29 Nov 2005 Electronic form version 1.4