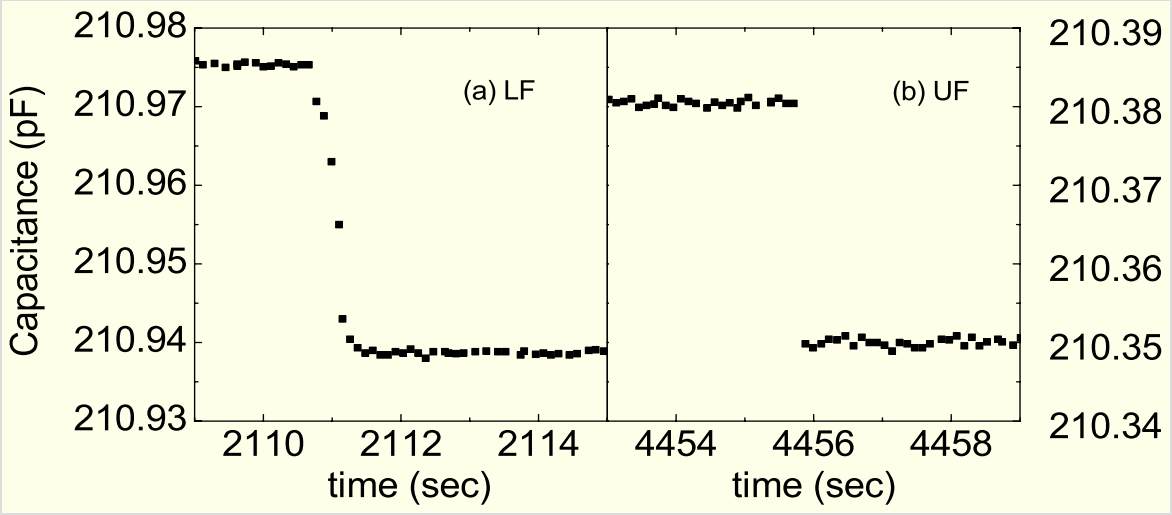
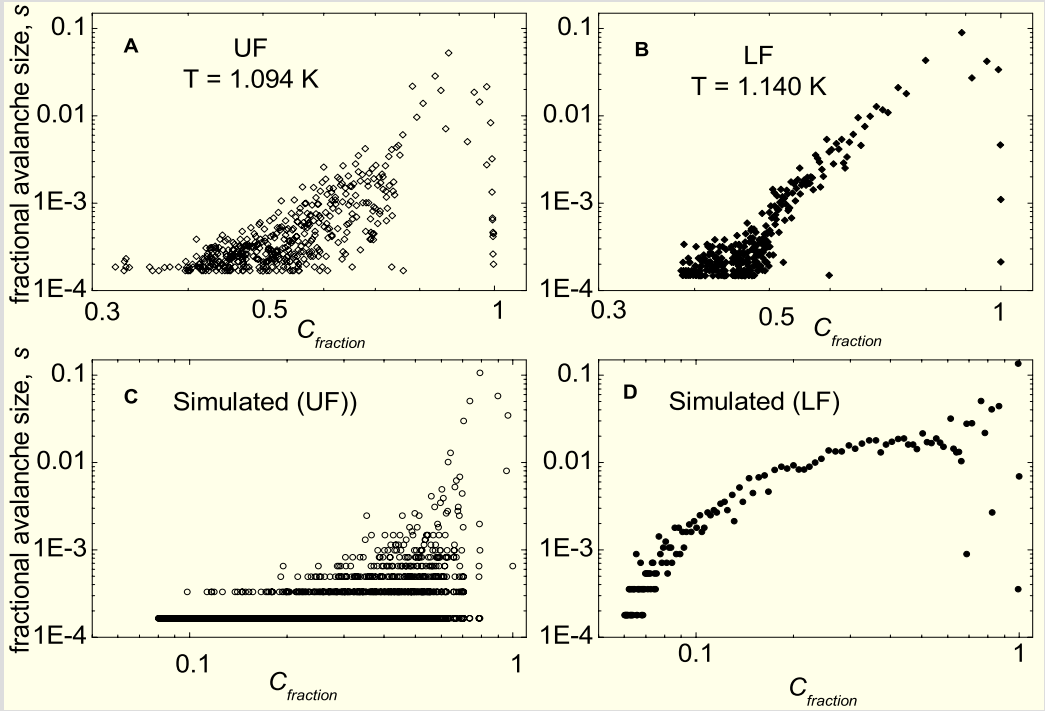
With the support of NSF DMR 01-38009 we made measurements with capacitive techniques of the draining of superfluid liquid helium from a capillary condensed nanoporous material with 200 nm pores and observed avalanches in the draining. The duration of an individual avalanche and the statistical behavior of the avalanches are found to depend on the flux of helium from the substrate. For conditions of unrestricted flow (UF) avalanches are prompt compared to those seen under conditions where the draining of the substrate is inhibited (LF) by geometric constraints.



When the flux is uninhibited, the avalanches have a somewhat broader size distribution than they do when the flux is limited. We attribute this behavior (and the duration difference) to the effect of surface waves in the helium film, third sound, on the menisci of the pores and have modeled the behavior

assuming the third sound can repeatedly perturb the menisci for the conditions of limited flux. The results of the modeling are shown here in comparison to the experimental results. A fractional avalanche size, s, of unity would represent complete draining of the substrate in a single avalanche. A $C_{fraction}$ value of unity represents a fully capillary condensed substrate; lower values represent a partially drained substrate. Avalanche size depends on $C_{fraction}$ and the distribution of avalanches depends on the constraints UF and LF.



Understanding of these phenomena (accepted by Phys. Rev. Letters) may lead to a better general understanding of fluid extraction from porous materials.

-- R.B. Hallock, DMR 01-38009, Univ. of Mass.