Studies of submicron ^{3}He slabs using a high precision torsional oscillator

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A high precision torsional oscillator has been used to study ^{3}He films of thickness in the range 100 to 350nm. In previous work we have found that the films decoupled from the motion of the oscillator below 60mK, in the Knudsen limit [1]. This precluded observation of the superfluid transition. Here we report measurements using a torsional oscillator whose highly polished inner surfaces have been decorated with a low density of silver particles to act as random elastic scattering centres. These appear to lock the normal film, consistent with the condition $\omega\tau \ll 1$ being satisfied. We discuss the superfluid transitions that have been observed with this set-up.

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