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Study of Liquid ^{3}He Films with MEMS Devices[1] PAN ZHENG, MIGUEL GONZALEZ, YOONSEOK LEE, Department of Physics, University of Florida, HO BUN CHAN, Department of Physics, The Hong Kong University of Science and Technology — Liquid ^{3}He films with thicknesses of 0.75 and 1.25 μm were established and probed by micro-electro-mechanical (MEMS) resonators each of which consists of a pair of parallel plates with a well defined separation. The mechanical resonances of the devices immersed in liquid ^{3}He were studied in a wide range of temperatures from 10 to 800 mK and at sample pressures of 3, 21, and 29 bar. A crossover from Fermi liquid to classical fluid was observed on warming. In the Fermi liquid regime, the damping coefficient associated with the film exhibits an unexpected temperature dependence below 100 mK. This work demonstrates the capacity of MEMS devices as sensitive probes suitable for the study of quantum fluids in a micrometer scale.

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Pan Zheng
Department of Physics, University of Florida

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