Glass Microfluidics for Quantum Fluids in Restricted Geometries

J. P. DAVIS, X. ROJAS, University of Alberta, Dept of Physics — Over the past few years we have developed a suite of measurements based on precisely defined glass microfluidic structures. Such measurements include sound velocity and attenuation in an acoustic analog of a Fabry-Perot cavity [1] and now a superfluid $^4$He nanomechanical Helmholtz resonator [2]. The latter is capable of precisely determining the superfluid density, which will be useful for exploration of Majorana fermions at the surface of $^3$He-B [3], as well as studies of quantum nanomechanical resonators. I will describe our devices and measurements, as well as possible future measurements including studies of quantum turbulence and low-temperature optomechanics [4].


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