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Superfluid ^4He Helholtz nanoresonator

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We have built and investigated the properties of a nanofluidic Helholtz resonator operating with superfluid ^4He . The density oscillations of the fluid are measured with an on-chip capacitor, allowing us to probe a small volume of helium contained in the resonator. Oscillators based on superfluid ^4He are expected to reach high quality factors due to its high purity and dissipationless flow. We have identified and studied the several dissipation mechanisms responsible for the limitation of the Q-factor in our device. Different improvements are proposed to reach higher Q-factors.

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