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A Superfluid Clock KONSTANTIN PENANEN, TALSO CHUI, JPL/Caltech — The performance of clocks is limited by the characteristics of the underlying oscillator. Both the quality factor of the oscillator and the signal-to-noise ratio for the resonator state measurement are important. A superfluid helium Helmholtz resonator operating at ∼100mK temperatures has the potential of maintaining frequency stability of $5\text{x}10^{-15}/\text{t}^{1/2}$ The high dynamic range of lossless SQUID position displacement measurement, and low losses associated with the superfluid flow, combined with high mechanical stability of cryogenic assemblies, contribute to the projected stability. Low overall mass of the assembly allows for multiple stages of vibration isolation.

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