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**Improved tunable microstrip SQUID amplifier for the Axion Dark Matter eXperiment (ADMX)** SEAN O'KELLEY, UC Berkeley, JORN HANSEN, Technical University of Denmark, JAN-MICHAEL MOL, RWTH Aachen, GENE HILTON, NIST, JOHN CLARKE, UC Berkeley — We present a series of tunable microstrip SQUID amplifiers (MSAs) for use in ADMX. The axion dark matter candidate is detected via Primakoff conversion to a microwave photon in a high-Q ($\approx 10^5$) tunable microwave cavity, cooled to 1.6 K or lower, in the presence of a 7-tesla magnetic field. The microwave photon frequency is a function of the unknown axion mass, so that the cavity and amplifier must be scanned over a broad frequency range. An MSA is constructed by flux-coupling a resonant microstrip to a resistively-shunted SQUID biased into the voltage state. We demonstrate gains exceeding 20 dB, at frequencies above 900 MHz. Tunability is achieved by terminating the microstrip with a low inductance GaAs varactor diode that operates at cryogenic temperatures. By varying the voltage bias of the varactor we vary its capacitance, allowing a reflected phase varying from nearly 0 to $\pi$ at the end of the microstrip, and thus a standing wave tunable from nearly $\lambda/2$ to $\lambda/4$. With proper design of the microwave environment, a noise temperature of 1/2 to 1/4 of the physical temperature is demonstrated.

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