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Characterization of Low Noise Superconducting Microwave Amplifiers TED WHITE, University of California Santa Barbara, R. BARENDS, J. BOCHMANN, B. CHIARO, Y. CHEN, J. KELLY, M. LENANDER, E. LUCERO, M. MARIANTONI, A. MEGRANT, C. NEILL, P. O'MALLEY, P. ROUSHAN, D. SANK, A. VAINSENCHER, J. WENNER, Y. YIN, ANDREW CLELAND, JOHN M. MARTINIS, UC Santa Barbara — We have developed an experimental setup to characterize low noise amplifier chains with a six port low temperature microwave switch controlled via room temperature electronics. This switch allows us to do a traditional Y-factor measurement, a reflection measurement with an open input, or a measurement using a Shot Noise Tunnel Junction(SNTJ) device developed by J. Aumentado and L. Spietz at NIST. The SNTJ allows one to measure system gain, system noise, and junction temperature as fit parameters. The SNTJ is sensitive enough characterize amplifiers with noise due primarily to photon ground state fluctuations or quantum limited amplifiers. We first tested our setup using a HEMT and room temperature amplifier chain with calibrated noise and gain characteristics. We then characterized several iterations of the theoretically quantum limited SLUG amplifier developed by R. McDermott at U Wisconsin Madison.

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