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Dual-path measurements of propagating microwave signals at the quantum level for circuit QED[1] E.P. MENZEL, M. MARIANTONI, F. DEPPE, M.A. ARAQUE CABALLERO, A. BAUST, E. HOFFMANN, T. NIEMCZYK, A. MARX, R. GROSS, Walther-Meissner-Institut and TU Muenchen, Garching, Germany, E. SOLANO, Universidad del Pais Vasco and Ikerbasque Foundation, Bilbao, Spain, K. INOMATA, RIKEN, Wako, Japan, T. YAMAMOTO, Y. NAKAMURA, NEC Corporation, Tsukuba and RIKEN, Wako, Japan — Few-photon propagating microwave signals can be characterized by means of a beam splitter and two amplification chains. We show that such a setup is robust against random noise added by the amplifiers. Even if this noise is much larger than the signal itself, the first two signal moments and, hence, Gaussian states can be analyzed via correlation measurements. We discuss possible applications of the dual-path method for detecting a squeezed state generated by a superconducting Josephson parametric amplifier and in circuit QED setups.

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