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**Quantum Limits on Probabilistic Amplifiers**[1] SHASHANK PANDEY, ZHANG JIANG, JOSHUA COMBES, CARLTON CAVES, Center for Quantum Information and Control, University of New Mexico — An ideal phase-preserving linear amplifier is a deterministic device that adds to an input signal the minimal amount of noise consistent with the constraints imposed by quantum mechanics. A noiseless linear amplifier takes an input coherent state to an amplified coherent state, but only works part of the time. Such a device is actually better than noiseless, since the output has less noise than the amplified noise of the input coherent state; we refer to such devices as immaculate. We bound the working probabilities of probabilistic and approximate immaculate amplifiers and construct theoretical models that achieve some of these bounds. Our chief conclusions are the following: (i) the working probability of any phase-insensitive immaculate amplifier is very small in the phase-plane region where the device works with high fidelity;(ii) phase-sensitive immaculate amplifiers that work only on coherent states sparsely distributed on a phase-plane circle centered at the origin can have a reasonably high working probability.

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