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Noise color and asymmetry in stochastic resonance with silicon nanomechanical resonators TYLER DUNN, DIEGO N. GUERRA, PRITIRAJ MOHANTY, Boston University Physics — Stochastic resonance (SR) with white noise has been well established as a potential signal amplification mechanism in nanomechanical two-state systems. While white noise represents the archetypal stimulus for SR, typical operating environments for nanomechanical devices often contain different classes of noise, particularly colored noise with a $1/f$ spectrum. As a result, improved understanding of the effects of noise color is necessary in maximizing device performance. Here, we report measurements of SR in a silicon nanomechanical resonator using $1/f$ noise and exponentially correlated Ornstein-Uhlenbeck noise. Power spectral densities and residence time distributions provide insight into asymmetry of the bistable amplitude states, and evidence suggests that $1/f^{\alpha}$ spectra with increasing noise exponent α may lead to increasing asymmetry in the system, reducing the achievable signal-to-noise ratio. Furthermore, we explore the effects of correlation time τ on SR with the use of exponentially correlated noise. We find monotonic suppression of the spectral amplification as the correlation time increases.

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