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Stochastic switching of microcantilever motion[1] WARNER VENSTRA, HIDDE WESTRA, HERRE VAN DER ZANT, Kavli Institute of Nanoscience — Fluctuation-induced transitions between two stable states of a strongly driven microcantilever are studied. Intrinsic geometric and inertial nonlinearities of the cantilever give rise to an amplitude-dependent resonance frequency, and at a critical point bifurcation occurs. Two states are stable, represented by vibration at a low and a high amplitude. Adding noise facilitates transitions between the states. The transition rate rises upon increasing noise intensity, as expected for noise-activated escape from a dynamic double well. Further increasing the noise intensity causes a parametric change in the dynamic double well, and results in a decay of the switching rate. Close to the onset of spontaneous transitions, the bistable cantilever is very sensitive. We demonstrate the noise-enhanced detection of weak modulations of the bistable cantilever, resulting in an optimum signal-to-noise ratio at non-minimum noise intensity.

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