

Abstract Submitted  
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**The physics of magnetic resonance in the proximity of energy instability**<sup>1</sup> MICHAEL PECHAN, CHENGTAO YU, RYAN BENNETT, Miami University, Oxford, OH, JORDAN KATINE, LIESL FOLKS, MATTHEW CAREY, Hitachi Global Storage Technologies, San Jose, CA — We are investigating the magnetization dynamics of a ferromagnetic system in the proximity of an unstable equilibrium. The test system utilized is permalloy in thin film and nano-scale dot geometries with the magnetization along the film normal at fields close to saturation ( $4\pi M_{eff}$ ). For sub-critical fields ( $H_{appl.} = 4\pi M_{eff}$ ), the magnetization equilibrates at some angle  $\theta$ , but has no energy minimum in the azimuthal angle  $\phi$ , therefore no resonance condition exists. Slight misalignment of the field removes the degeneracy in  $\phi$  resulting in an energy minimum in both the  $\theta$  and  $\phi$  directions. This produces finite resonances at sub-critical fields. This sub-critical energy minimum resembles an asymmetrical ‘bowl’ that changes shape with field and misalignment angle. We model measured frequency/field dispersion curves in terms of the Landau-Lifshitz equations of motion about the equilibrium position and interpret the results in terms of the ‘bowl’ geometries. We also explain the observance of a local minimum, close to  $4\pi M_{eff}$ , resulting in the three resonances in a constant frequency/swept field scan.

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