

MAR17-2016-003872

Abstract for an Invited Paper  
for the MAR17 Meeting of  
the American Physical Society

**Softening and Hardening Mechanisms in Dislocation-Enabled Plasticity**

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For over half a century, dislocation theories of plasticity have been largely phenomenological; they have not been able to provide predictive first-principles explanations of basic phenomena such as strain hardening or dynamic failure. In this talk, I will summarize the main features of a statistical thermodynamic theory of dislocation-enabled plasticity. This theory now seems to be addressing many of the the central issues successfully. If time permits, I will show how it predicts runaway shear banding instabilities that are observed experimentally.