

Mardi 19 juillet 2016 à 10h30

Salle de réunion du SRMP – Bâtiment 520 - Pièce 109

Kink pair nucleation and dislocation motion

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The motion of extended defects called dislocations controls the mechanical properties of crystalline materials such as strength and ductility. Under moderate applied loads, this motion proceeds via the thermal nucleation of kink pairs. The nucleation rate is known to be a highly nonlinear function of the applied load (measured as the 40th power!), and its calculation has long been a theoretical challenge. In this work, a stochastic path integral approach is used to derive a simple, general, and exact formula for the rate. The predictions are in excellent agreement with experimental and computational investigations, and unambiguously explain the origin of the observed extreme nonlinearity. The results can also be applied to other systems modelled by an elastic string interacting with a periodic potential, such as Josephson junctions in superconductors.

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