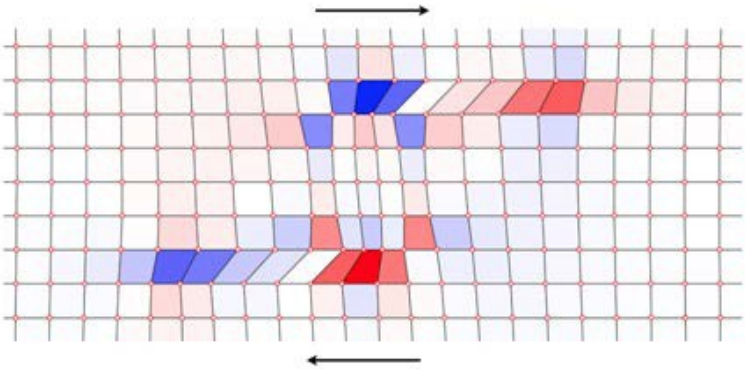
13 dic 2012
ore 11:00

SEMINARIO

Consiglio Nazionale delle Ricerche
Istituto per l'Energetica e le Interfasi
U.O.S. di Milano

Critical nature of plastic flow in metals and shape memory alloys



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The origin of the apparently chaotic and at the same time highly correlated microscopic response in plasticity remains hidden behind conventional engineering models which are based on smooth fitting functions. To regain access to fluctuations, we consider a minimal mesoscopic model whose goal is to elucidate the origin of scale free. We provide simple illustrations of the fact that complexity in rate independent athermal plastic flows is due to marginal stability of the underlying elastic system. Our conclusions are based on a reduction of an over-damped visco-elasticity problem for a system with a rugged elastic energy landscape to an integer valued automaton.
We also discuss the peculiarity of critical behavior in shape memory alloys which in some types of crystals is due to limited dislocational activity while in others may be an effect of inertia.

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