

Precursors, strain glass and avalanches in martensitic transitions

Marcel Porta¹, Teresa Castán², Pol Lloveras³, Avadh Saxena⁴, and Antoni Planes²

¹*Departament de Física Quàntica i Astrofísica, Facultat de Física,
Universitat de Barcelona. Diagonal 647, 08028 Barcelona, Catalonia*

²*Departament de Física de la Matèria Condensada, Facultat de Física,
Universitat de Barcelona. Diagonal 647, 08028 Barcelona, Catalonia*

³*Departament de Física, EEBE, Av. Eduard Maristany 10-14, 08019 Barcelona, Catalonia*

⁴*Theoretical Division, Los Alamos National Laboratory, Los Alamos, NM 87545, USA*

Martensitic transitions are often preceded by nanoscale, modulated textures associated with local symmetry breaking effects. Disorder and long-range anisotropic interactions are the essential ingredients for these precursors to occur. In some circumstances due to the screening of long-range correlations the martensitic transition is kinetically arrested and the system becomes frozen into a strain glass phase. We will demonstrate that the properties of martensitic systems are controlled by the combined effect of the amount of disorder and elastic anisotropy. We will discuss a phase field model that reproduces such behavior and reveals that the response of these systems to an applied stress should occur intermittently through avalanches. A crossover from a critical to a super-critical distribution of the avalanche sizes is predicted when the amount of disorder is increased or the elastic anisotropy is decreased.

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