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Local waiting time fluctuations along a randomly pinned crack front STEPHANE SANTUCCI, KNUT JORGEN MALOY, RENAUD TOUSSAINT, JEAN SCHMITTBULH, University of Oslo — The propagation of an interfacial crack along a heterogeneous weak plane of a transparent Plexiglas block is followed using a high resolution fast camera. We show that the fracture front dynamics is governed by local and irregular avalanches with very large size and velocity fluctuations. We characterize the intermittent dynamics observed, i.e. the local pinnings and depinnings of the crack front which trigger a rich burst activity, by measuring the local waiting time fluctuations along the crack front during its propagation. The local front line velocity distribution deduced from the waiting time analysis exhibits a power law behavior, $P(v) \propto v^{-\eta}$ with $\eta = 2.55 \pm 0.15$, for velocities v larger than the average front speed $\langle v \rangle$. The burst size distribution is also a power law, $P(S) \propto S^{-\gamma}$ with $\gamma = 1.7 \pm 0.1$. Above a characteristic length scale of disorder $L_d \sim 20\mu m$, the avalanche clusters become anisotropic, and the scaling of the anisotropy ratio provides an estimate of a local roughness exponent, $H = 0.6$.

Stephane Santucci
University of Oslo

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