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Predicting large events in power-law distributed avalanches: implications for earthquake forecast. OSVANNY RAMOS, Physics Department, University of Oslo, Blindern, 0316 Oslo, Norway, ERNESTO ALTSHULER, "Henri Poincare" group of Complex Systems, Physics Faculty, University of Havana, 10400 Havana, Cuba, KNUT JORGEN MALOY, Physics Department, University of Oslo, Blindern, 0316 Oslo, Norway — It is a common idea that power law distributed avalanches are inherently unpredictable. It mostly comes from the concept of Self-organized criticality. Nevertheless, we have found in classical simulations and experiments where the slowly addition of energy drives the system into a state of power law distributed avalanches, clear signs of both long and short term prediction. The simulations consist of a more realistic modification of the Olami-Feder-Christensen earthquake model where criticality and periodicity coexist. The experiment shows a clear power law behaviour for almost three decades in the avalanche size distribution of moving grains in a "sandpile" setup. Both systems display characteristic waiting times between large avalanches, and their internal structure suffer continuous variation preceding a large event. Monitoring those variations it is possible to predict large avalanches in a system if the slope of its pdf is larger than 1 in absolute value.

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