



Experimental study of frictional processes: acoustic emission from a sheared granular medium

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Natural hazards such as earthquakes have strong and dramatic effects and Italy is a country with highly seismic zones, in which earthquakes have caused a wide scope of damages and human deaths in the last few years. Thus, the understanding and the prediction of these phenomena are obviously important for humans, but are also challenging in term of fundamental physics. Even if earthquake systems are commonly described using rate and state dependent fault models, the physical processes generating seismicity are highly complex and not fully understood.

We investigate experimentally the frictional sliding in a granular medium using ultrasonic techniques and we focus on the jamming/unjamming transition. Acoustic emission (AE) is recorded during spring-driven shear tests on a 3-D granular sample. The transition from a stick-slip response to a liquid-like behavior of the granular material is observed when the applied shear rate increases. The AE signals are clearly different for the two regimes, but the AE intensity is related to the shear rate in both cases. In addition, the acoustic emission presents different signatures for each regime: in the frequency domain, as well as in the distribution of AE intensities.