

Colloquium

Bohlein T. et al., *Nature Materials* **11**, 126–130 (2012)

FALL 2012

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Observation of kinks and antikinks in colloidal monolayers driven across periodic and quasiperiodic surfaces

day

NOVEMBER 14, 2012 WEDNESDAY

location

EE01

time

16:00

ABSTRACT

Friction between solids is responsible for many phenomena like earthquakes, wear or crack propagation. Unlike macroscopic objects which only touch locally due to their surface roughness, spatially extended contacts form between atomically flat surfaces. They are described by the Frenkel-Kontorova model which considers a monolayer of interacting particles on a periodic substrate potential. In addition to the well-known slip-stick motion such models also predict the formation of kinks and antikinks which largely reduce the friction between the monolayer and the substrate. Here, we report the direct observation of kinks and antikinks in a two-dimensional colloidal crystal which is driven across different types of ordered substrates. We show that the frictional properties only depend on the number and density of such excitations which propagate through the monolayer along the direction of the applied force. In addition, we also observe kinks on quasicrystalline surfaces which demonstrates that they are not limited to periodic substrates but also occur under more general conditions.

The Physics Colloquia are designed to address a non-specialist, broad audience and introduce topics of contemporary research through lectures by leading experts. We warmly invite all members of the student body, including undergraduates enrolled in any programme.

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