PHYSIKALISCHES KOLLOQUIUM

UND

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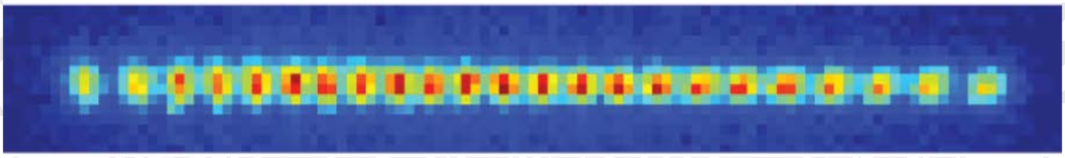
AM 9. NOVEMBER 2015 UM 17 UHR C.T.

IM GROßEN HÖRSAAL



WHAT DOES THE GOLDEN RATIO HAVE TO DO WITH FRICTION? AN ANSWER ATOM BY ATOM

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Friction is the basic, ubiquitous mechanical interaction between two surfaces that results in resistance to motion and energy dissipation. In spite of its technological and economic significance, our ability to control friction remains modest, and our understanding of the microscopic processes incomplete. To test long-standing atomistic models of friction processes at the nanoscale, we implemented a synthetic nanofriction interface using laser cooled ions subject to the periodic potential of an optical standing wave. We show that stick-slip friction can be tuned from maximal to nearly frictionless via arrangement of the ions relative to the periodic potential, and that friction at the nanoscale can substantially differ from the simple phenomenological laws observed at the macroscale. We also establish a direct link between Aubry's structural transition for an infinite chain in an incommensurate periodic potential, and the vanishing of friction in nanocontacts.