



פרופסור תומס ויטן

המחלקה לפיזיקה, המכון ע"ש ג'יימס פרנק
אוניברסיטת שיקגו, ארה"ב

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קולוקוויום | Colloquium

INFORMATION FLOW IN A JAMMED PACK

Imagine a few thousand small solid spheres dispersed in a large box. The spheres gradually expand, displacing one another until they are no longer free to move. The resulting state of "marginal jamming" is qualitatively unlike conventional solids characterized by elastic constants. Thus a force applied to one sphere and propagating through the jammed system cannot be described via conventional elastic deformation modes. Instead the deformation is described by a new class of "marginal modes" that act as conduits for force. These modes reflect the "isostatic" duality of the marginally jammed state: the deformations may be specified on an equal footing either by the vector sphere displacements or by the scalar contact separations. Here we measure the ability of a marginally jammed system to transmit perturbations of one surface to the opposite surface. New simulations suggest that this transmission is limited by a weak form of localization of the marginal modes that was not previously recognized. We contrast this localization with the topologically protected modes seen in certain constructed isostatic systems [cf. Sussman, Stenull, Lubensky 2015].

The lecture will be held on Sunday
15 May 2016, at 14:00, Melamed Hall
Shenkar Physics building
Tel-Aviv University, Ramat-Aviv

ההרצאה תתקיים ביום ראשון
15 במאי 2016, בשעה 14:00
אולם מלמד (6), בניין שנקר לפיזיקה
אוניברסיטת תל-אביב, רמת-אביב

סמינר | Seminar

PREDICTING COMPLEX ELECTROPHORETIC MOTIONS OF UNEVENLY CHARGED COLLOIDS

Biology provides us many reproducible colloid-scale systems that have reproducible but asymmetric charge distributions. Such objects have complex tensor responses to an electric field. They translate and rotate in directions that depend on both the field and their orientation. We report a discrete particle simulation method aimed at predicting these tensor responses. The discrete particles carry charge, countercharge and stokes drag. They respect the conservation of momentum and angular momentum that distinguish the electrophoretic response. Using two thousands of these discrete particles we reproduce the known motion of monopolar, dipolar and quadrupolar charges on a sphere to less than five percent. Since this method does not rely on symmetries of the object, it can readily be generalized to arbitrary shapes. We show nonintuitive motions arising from time-varying driving fields.

The lecture will be held on Wednesday
8 June 2016, at 11:00
room 118, Kaplun Physics Building
Tel-Aviv University, Ramat-Aviv

ההרצאה תתקיים ביום רביעי
8 ביוני 2016, בשעה 11:00
חדר 118, בניין קפלון לפיזיקה
אוניברסיטת תל-אביב, רמת-אביב