Seminar/Talk

Rabbits, planets, volcanoes, dust devils: the surprising physics of granular tribocharging

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If you shuffle your feet across a carpet and touch a doorknob, you might get shocked. This is tribocharging--the transfer of electrical charge between different materials. Although it was observed to occur even in ancient Greece, we know surprisingly little about it. One of the most perplexing observations is that objects of the same material, when rubbed together, still exchange charge in a systematic way. This is especially prevalent in granular systems, where grains are in constant frictional contact. Inspired by Millikan's oil drop experiment, I will describe experiments that aim to understand where this charging comes from. Using a free-fall setup, we work in a zero gravity environment and precisely measure grain charges, which allows us to test the prevailing theory for how charge transfer occurs. We also witness a zoology of dynamic behaviors arising from charged interactions, including attractive orbits and repulsive slingshot events, cluster growth via capture, and cluster annihilation via impact. These results have important implications in for both the origin of same-material tribocharging and the resulting consequences in a wide variety of natural systems.

Tuesday, February 27, 2018 09:00am - 10:00am
Big Seminar room Ground floor / Office Bldg West (I21.EG.101)

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