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Laboratoire PMMH  
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## Séminaire PMMH

*Bureau d'Études, Bâtiment L, 2<sup>ème</sup> étage*

*Vendredi 24 juin 2016, 11h00-12h00*

### Scott Waitukaitis

Leiden University

#### **Rabbits, Planets, Volcanoes, Dust Devils : The Surprising Physics of Granular Tribocharging**

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 as early as 600 B.C. 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. In nature, this is known to occur in granular systems, where it can cause large electric dipoles in dust devils and lightning during volcanic eruptions. We study same-material tribocharging in large granular ensembles with an experimental system inspired by Millikan's oil drop experiment. By using a free-fall setup, we can witness interactions between individual microscopic grains that are otherwise hidden by gravity.

The zoology of behaviors includes attractive orbits and repulsive slingshot events, cluster growth via molecule formation, and cluster annihilation via high-speed impact. Using orbital paths, we estimate charges for pairs of particles by fitting; alternatively we also measure the ensemble charge distribution via acceleration by a uniform external electric field. We observe firsthand the important role of particle polarization, especially in molecule formation. These results have important implications in contexts ranging from the origin of same-material tribocharging to the agglomeration of protoplanetary dust.



Prochain séminaire : vendredi 1 juillet, Monica Oliveira (University of Strathclyde)  
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