



香港浸會大學

HONG KONG BAPTIST UNIVERSITY

FACULTY OF SCIENCE

Department of Physics & Institute of Computational and Theoretical Studies

JOINT COLLOQUIUM

Broken mirror symmetry and inelastic electron tunneling: single – molecular dynamics and unidirectional motors at surfaces

BY

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3:15pm – 4:15pm (Tea will be served)

T909, Science Tower, HSH Campus

Abstract

Propelling single molecules in a controlled manner along an unmodified surface remains extremely challenging because it requires molecules that can use light, chemical or electrical energy to modulate their interaction with the surface in a way that generates motion. Biomolecular motors, such as the protein kinesin or the F1-ATPase, function as linear walkers or rotary motors. Chemists strive for synthesis of molecules that can perform unidirectional motion on surfaces. One successful approach was the use of ratchet-style unidirectional rotors based on overcrowded helical systems.

We show that excitation with inelastically tunneling electrons emanating from the tip of a scanning tunneling microscope (STM) very efficiently excites the rotors and leads to linear movement of the molecule on the surface for the right isomer. This requires a transient electron attachment into the LUMO, while vibronic excitation of the motor axles lead to reversible rearrangement without movement. We will discuss possible mechanisms and implication for further research and design of nanotechnological devices.

All Interested Are Welcome!