BIOENGINEERING SEMINAR

“Water Transport through Individual Nanotubes”

Monday – December 12, 2016 – 12h00
EPFL – room CM 1 105

Prof. Alessandro Siria
Laboratoire de Physique Statistique, École Normale Supérieure (ENS), Paris (F)

host: Prof. Aleksandra Radenovic

Abstract

Nanofluidics is the frontier where the continuum picture of fluid mechanics confronts the atomic nature of matter. Recent reports indicate that carbon nanotubes exhibit exceptional water transport properties due to nearly frictionless interfaces and this has stimulated interest in nanotube-based membranes for desalination, nano-filtration, and energy harvesting. However, the fundamental mechanisms of water transport inside nanotubes and at water-carbon interfaces remain controversial, as existing theories fail to provide a satisfying explanation for the limited experimental results.

In this talk we will present our recent experimental study on water transport through individual nanotubes: our experiments reveal extensive and radius-dependent surface slippage in carbon nanotubes. In stark contrast, boron-nitride nanotubes, which are crystallographically similar to CNTs but electronically different, exhibit no slippage.

Our results show that slippage originates in subtle atomic-scale details of the solid-liquid interface.