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Measuring velocity profiles and nanoparticle interactions between 20 and 300 nm from surfaces PATRICK TABELING, CEDRIC BOUZIGUES, ESPCI, MICROFLUIDICS TEAM — The observation of flows at a nanometric scale is crucial for understanding phenomena involving interactions between liquids and solid surfaces, such as slippage and electro-osmosis. Here we report a new method based on nanoparticle imaging by total internal reflection fluorescence, allowing the first observation of water flows between 20 and 300 nm from surfaces. We probed the energy landscape, leading to first local measurements of the Debye length and surface/nanoparticle interactions; and provide an unambiguous determination with 10 nm accuracy of the slip length for different surfaces - wetting, non-wetting, hard, soft. These results represent an improvement of one order of magnitude compared to the state of the art. In addition to investigating locally energetic and electrostatic properties of the wall/liquid system, this Letter lays down the foundations of a technique that can foster the development of nanofluidics: Imaging of Nanoparticles for Energy landscape and Speed flow measurements (INES).

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