



The Physics of Soft and Biological Matter

P.21 A Landau-Squire nanojet

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Fluid jets are found in nature at all length scales, from microscopic to cosmological. We have been investigating what may be one of the smallest liquid jets ever observed: an electroosmotically driven flow from a single glass nanopore about 75 nm in radius with a maximum flow rate around 30 pL/s. A novel anemometry technique allows us to map out the vorticity and velocity fields which show excellent agreement with the classical Landau-Squire solution of the Navier Stokes equations for a point jet. We observe a phenomenon that we call flow rectification: an asymmetry in the flow rate with respect to voltage reversal. In addition to technological applications in nano patterning and microfluidics, such nanojets are fascinating because their behaviour is intricately linked to the mechanisms of ion transport and rectification in biological and artificial nanopores.