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Ionic conductance in nanopores JOHAN LAGERQVIST, University of California - San Diego, MICHAEL ZWOLAK, California Institute of Technology, MASSIMILIANO DI VENTRA, University of California - San Diego — We study ionic transport through nanopores from the perspective of the microscopic electrostatics. We predict the existence of step-like structures in the ionic conductance as a function of both nanopore diameter and ionic concentration. This is due to the formation and breakage of hydration layers around the ions. In bulk water, there are a few of these layers around each ion. As an ion goes through the pore, some of the hydration layers break and thus create an energetic barrier for ion transport. The number of broken layers depends on the pore diameter and the ionic concentration. In this talk, we discuss various properties of the hydration layers and the parameter range necessary to experimentally observe quantized conductance of ions through nanopores. Work supported in part by NSF and NIH.

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