

Abstract Submitted
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Ionic Coulomb Blockade in Nanopores¹ MATT KREMS, MASSIMILIANO DI VENTRA, University of California, San Diego — Understanding the dynamics of ions in nanopores is essential for potential applications in molecule detection, DNA sequencing, and other technologies [1]. We show both analytically and by means of molecular dynamics simulations that ion-ion interactions in nanopores leads to the phenomenon of ionic Coulomb blockade, namely the build-up of ions inside a nanopore with specific capacitance impeding the flow of additional ions due to Coulomb repulsion. This is the classical counterpart of electronic Coulomb blockade in mesoscopic systems. We discuss the analogies and differences with the electronic case as well as experimental situations in which this phenomenon could be detected.

[1] M. Zwolak, M. Di Ventra, Physical Approaches to DNA sequencing and Detection, Rev. Mod. Phys. 80, 141 (2008).

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