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DNA sequencing via transverse electronic transport JOHAN LAGERQVIST, University of California - San Diego, MICHAEL ZWOLAK, California Institute of Technology, MASSIMILIANO DI VENTRA, University of California - San Diego — Recently, it was theoretically shown that transverse current measurements could be used to distinguish the different bases of single stranded DNA. [1] If electrodes are embedded in a device, e.g., a nanopore, which allows translocation of ss-DNA, the strand can be sequenced by continuous measurement of the current in the direction perpendicular to the DNA backbone. [1] However, variations of the electronic signatures of each base in a real device due to structural fluctuations, counter-ions, water and other sources of noise will be important obstacles to overcome in order to make this theoretical proposal a reality. In order to explore these effects we have coupled molecular dynamics simulations with transport calculations to obtain the real time transverse current of ss-DNA translocating into a nanopore. We find that distributions of currents for each base are indeed different even in the presence of all the sources of noise discussed above. These results support even more the original proposal [1] that fast DNA sequencing could be done using transverse current measurements. Work supported by the National Humane Genome Research Institute.

[1] M. Zwolak and M. Di Ventra, "Electronic Signature of DNA Nucleotides via Transverse Transport", Nano Lett. 5, 421 (2005).

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