

Abstract Submitted  
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**Monte Carlo simulations of polymer translocation through a nanopore**<sup>1</sup> TAPIO ALA-NISSILA, KAIFU LUO, ILKKA HUOPANIEMI, Laboratory of Physics, Helsinki University of Technology, P.O. Box 1100, FIN-02015 HUT, Espoo, Finland, SEE-CHEN YING, Department of Physics, Box 1843, Brown University, Providence, RI 02912-1843, U.S.A., HELSINKI UNIVERSITY OF TECHNOLOGY TEAM, BROWN UNIVERSITY COLLABORATION — We investigate the problem of polymer translocation through a nanopore using the fluctuating bond model with single-segment Monte Carlo moves. For non-driven case we study the escape time  $\tau_e$  required for a polymer, which is initially placed in the middle of the pore, to completely exit the pore on either end. We find  $\tau_e \sim N^{1+2\nu}$ , where  $N$  is the chain length and  $\nu$  is the Flory exponent. We also examine the interplay between the pore length  $L$  and the radius of gyration  $R_g$ . For driven case we find a crossover scaling for the translocation time  $\tau$  with  $N$  from  $\tau \sim N^{2\nu}$  for relatively short polymers to  $\tau \sim N^{1+\nu}$  for longer chains. This crossover is due to the change of the translocation velocity  $v$  from  $v \sim N^{-\nu}$  for relatively short chains to  $v \sim N^{-1}$  for long polymers. The reason is that a high density of segments near the exit of the pore for long polymer slows down the translocation process due to slow relaxation of the chain.

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