

# PHYSICAL MATHEMATICS SEMINAR

## Theory of Driven Polymer Translocation through Nanopores

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### ABSTRACT:

The translocation dynamics of polymers through nanopores driven by external fields is a far-from-equilibrium process, which can be understood based on the tension propagation (TP) theory of Sakaue [1]. In particular, the coarse grained Brownian Dynamics TP theory within the iso-flux (IFTP) assumption [2] allows a self-consistent derivation of analytic equations of motion for the dynamics, including an explicit form for the chain length dependence of the average translocation time [3]. In this talk I will discuss the fundamentals of the IFTP theory and its various applications theory to translocation dynamics of long semi-flexible [4] and end-pulled polymer chains [5]. Time permitting I will also discuss recent works trying to elucidate the role of hydrodynamics and electrostatic interactions on translocation of rod-like molecules in finite and infinite cylindrical nanopores [6].

1. T. Sakaue, Phys. Rev. E 76, 021803 (2007).
2. P. Rowghanian and A. Y. Grosberg, J. Phys. Chem. B 115, 14127 (2011).
3. J. Sarabadani, T. Ikonen and T. Ala-Nissila, J. Chem. Phys. 141, 214907 (2014); J. Sarabadani and T. Ala-Nissila, J. Phys. Cond. Matt. 30, 274002 (2018).
4. J. Sarabadani, Timo Ikonen, Harri Mökkönen, Tapio Ala-Nissila, Spencer Carson, and Meni Wanunu, Sci. Reps. 7, 7423 (2017).
5. J. Sarabadani, B. Ghosh, S. Chaudhury, and T. Ala-Nissila, EPL 120, 38004 (2017).
6. S. Buyukdagli and T. Ala-Nissila, J. Chem. Phys. 147, 114904 (2017); J. Chem. Phys. 147, 144901 (2017); S. Buyukdagli, R. Blossey, and T. Ala-Nissila, Phys. Rev. Lett. 114, 088303 (2015); S. Buyukdagli, J. Sarabadani, and T. Ala-Nissila, Polymers 11, 118 (2019).

**TUESDAY, MARCH 12, 2019**

**2:30 PM – 3:30 PM**

**Building 2, Room 139**

*Reception following in Building 2, Room 290  
(Math Dept. Common Room)*

<http://math.mit.edu/seminars/pms/>