



# BiophysTO Lunchtime Seminar Series

**Date**

**November 18<sup>th</sup> 2021  
12:00 – 1:00 pm**

**Prof. Ulrich F. Keyser**

Cavendish Laboratory  
University of Cambridge

**Driven polymers:**

**From basic biophysics to identification of RNA viruses**

Non-equilibrium processes, like the driven the translocation of ions and polymers, are ubiquitous in biological systems. In this talk I will demonstrate how we use experiments on the meso-scale, using colloidal particles in confinement manipulated with optical forces, to reveal microscale phenomena. The first experiment will show that we can identify molecular intermediate states from the analysis of first passage times. In the second example we create phenomena akin to molecular gating in particle transport through mesoscopic channels. In the second part, I will discuss our use of DNA nanotechnology to shape of nanometer-sized objects. In combination with nanopores DNA self-assembly allows for novel experiments that reveal the physics of ions, and polymers on the single molecule level. Nanopore sensing, best known for DNA sequencing, translates the three-dimensional structure of molecules into ionic current signals. Designed DNA molecules enable multiplexed protein sensing with an all-electrical approach and may pave the way to data storage applications. Here, I will discuss our recent developments to detect and localise structures as accurately as possible along DNA molecules approaching super-resolution microscopy. We have developed DNA nanostructures that reveal the individual velocity fluctuations of molecules in nanopores. Our quantitative understanding of polymer dynamics in nanopores reveals position information of binding to a few ten basepairs. The talk will end with a brief outlook on applications in the area of DNA data storage and detection of RNA viruses.

**Zoom Link:**

**Host: Anton Zilman**

<https://us02web.zoom.us/j/89407663380?pwd=OFBMczlhWVZKbUswQzk3VXNkLzhGdz09>



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