

Department of Physics

Condensed Matter Physics

Clarendon Laboratory, Parks Road, Oxford OX1 3PU



UNIVERSITY OF
OXFORD

CONDENSED MATTER SEMINAR

Monday 15 June at 3.00pm

“Optical superresolution microscopy of molecular mechanisms of disease”

Clemens F. Kaminski

Department of Chemical Engineering and Biotechnology, University of Cambridge, UK.

The self-assembly of proteins into ordered macromolecular structures is fundamental to a variety of diseases, for example in neurodegeneration, where misfolded proteins aggregate into toxic fibrillar shapes, or during virus replication, where the assembly of functional virions in the host cell is a tightly organized process.

In this talk, I will give an overview of optical imaging techniques (1-3) that allow us to gain insights into protein self-assembly reactions in vitro (4 - 7), in cells (8 - 10), and in live model organisms of disease (11). In particular, we wish to understand how proteins nucleate to form functional or toxic structures and to correlate such information with biological phenotypes. I will show how single molecule localization microscopy, and developments in high speed structured illumination microscopy are capable of tracking the aggregation of proteins in vitro and in vivo, and how such data are interpreted in the context of disease (11-17).

References:

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- (5) D. Pinotsi et al, Nano Letters (2013)
- (6) R. Laine et al, Nat. Comms (2018)
- (7) R. Laine et al, eLife (2018)
- (8) E. Avezov et al., Nat. Cell Biol.(2018)
- (9) D. Pinotsi et al, PNAS (2016)
- (10) M. Lu et al, JBC (2019)
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- (12) T. Murakami, et al, Neuron (2015)
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- (14) G. Fusco, et al, Nat. Comms. (2016)
- (15) S. Qamar, et al, Cell (2018)
- (16) J. Lautenschlaeger et al., Nat. Comms. (2018)
- (17) T Shigeoka et al., Cell Reports (2019)

Host: Prof Achillefs Kapanidis

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