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Imaging the cell

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Abstract. In the 'Imaging the cell' session we explore a range of biological questions that have been addressed at the level of single cells using cutting-edge imaging tools. The scope for emergent biophysical technologies in this area is broad, capturing exciting techniques such as state-of-the-art high precision structural methods[1,2] and innovative light microscopy approaches[3,4] in particular, often pushing the limits of detection sensitivity to the single-molecule level[5,6]. To start our session we have an invited talk from Martin Booth (University of Oxford, UK) concerning advances in adaptive optics for microscopy and nanoscopy, which have enabled valuable progress in imaging cells deep in tissues to super-resolution precicision[7]. Our second invited speaker John Briggs (EMBL, Germany) will discuss the use of cryo-electron tomography to determine protein structures within complex environments, an imaging technology which has enabled unprecedented insight into the architecture of macromolecular machines in the complex milieu of cells[8]. Our first contributed talk in the session is then from Lóránd Kelemen (Biological Research Centre, Hungary) who will tell us about the application of indirect optical micromanipulation in fluorescent 3D live cell imaging, an interesting new approach which enables 3D reconstruction of single cells by imaging them at different orientations[9]. Our third invited speaker is James McNally (Helmholtz-Zentrum Berlin, Germany) who will talk on the topic of cryo X-ray tomography to enable 3D cellular imaging of the ultrastructure of intact cells without the use fixation or staining[10]. Our second contributed talk then comes from Sviatlana Shashkova (University of York, UK) who will discuss how clusters of transcription factor regulate gene expression in single cells, explored using high-speed live cell single molecule fluorescence microscopy[11,12]. Our session then ends with a contributed talk from Eva Arnspang (University of Southern Denmark, Denmark) who will talk to us about aquaporin water channels studied using pair correlation analysis of fixed PALM and live PALM[13]. A must-see session!

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