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Single-molecule based super-resolution imaging

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Sebastian van de Linde did his PhD at the Faculty of Physics, Bielefeld University in Germany. He was working on the Photoswitching of Organic Dyes and Single-Molecule Based Super-Resolution Imaging under the supervision of Prof. Sauer. From 2011 to 2016 he was an Associate Researcher in the department of Biotechnology and Biophysics at the university of Würzburg. He did a first stay abroad in 2013 at the University of Cambridge in the Group of Dr. Kaminski and a second one in 2014 in Sydney in the Group of Prof. Kaminski. Since 2016 Sebastian van de Linde is a Lecturer and Chancellor's Fellow at the University of Strathclyde, Glasgow, Scotland.

Career advice:

• identify what you like, where your passion lies
• define a goal, focus on and work towards it
• stay curious and explore

Abstract:

Fluorescence microscopy is the method of choice to study biological samples in a comparatively non-invasive way. The field has received a powerful boost with the development of super-resolution imaging methods, which overcome the limitations imposed by optical diffraction.
A very strong class of these novel techniques can be merged under the generic term single-molecule localization microscopy (SMLM), which relies on the detection of single-molecules, their precise localization and the reconstruction of an artificial super-resolution image. It can improve on the ~200 nm resolution limit by a factor of ten and more, and thus has opened the door for the study of finer cellular ultrastructure.
While in the early days the focus was on methodological advancement, such as characterization of fluorophores and engineering of multicolour and 3D imaging capabilities, in recent years SMLM is increasingly applied in biology and medicine. Besides its high spatial resolution SMLM also provides access to quantitative information and thus enables the study of structure-function relationships.
I will provide a concise overview of the development and underlying principles of SMLM with an emphasis on dSTORM, describe novel technical developments and conclude with applications in the field of neurobiology.

Primary author(s) : VAN DE LINDE, Sebastian (Department of Physics, University of Strathclyde, Glasgow)

Presenter(s) : VAN DE LINDE, Sebastian (Department of Physics, University of Strathclyde, Glasgow)

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