Monday, February 21
10:30 AM – 12:00 PM
Esplanade, Room 158
Bruker

Single-Molecule Localization for Advanced Biological and Genomic Imaging: The Bruker Vutara VXL
Most sub-cellular structures are smaller than 300 nm. Because the size of these structures is below the classical resolution limit for fluorescence microscopy, we cannot use the specificity of this powerful technology to resolve them. The single-molecule localization technology (SMLM) implemented in the Bruker Vutara VXL overcomes this limitation. With an optical resolution of 20 nm, SMLM is uniquely qualified to address biological mysteries that require specific labeling as used in fluorescence microscopy but higher resolution than can be achieved with diffraction-limited microscopy. In addition to SMLM, the Vutara VXL implements imaging workflows for multiplexed chromatin tracing and smFISH applications. Thus the system allows imaging, resolving, and quantifying cellular structures, molecular machines, proteins, RNA, and chromosomal structures.

SMLM modulates the emission from dye molecules to prevent their point-spread-function (PSF) spatial overlap. Advanced fitting algorithms localize the position of each dye molecule with a resolution well below the optical resolution limit. The proprietary bi-plane technology of the Bruker Vutara VXL extends the traditional 2D fitting into the third dimension, far away from the coverslip. In STORM and PALM, a laser switches dye molecules actively on and off. Special imaging buffers create a similar blinking spontaneously in dSTORM. DNA-PAINT relies on oligonucleotides' transient binding, and genomic applications use sparse labeling and multiplexing.

The Bruker Vutara VXL brings these methods to every scientific lab. The instrument is small enough to fit on a classical lab bench. No darkroom is required. The easy-to-use workflow-oriented software includes everything needed to control the system, determine localizations, visualize the results, and apply advanced statistical analysis. Fluidics hardware controlled by the Bruker Vutara VXL enables data-rich multiplexing and genomics workflow.

This workshop will discuss the applications and foundations of SMLM and genomics imaging, the requirements to do successful experiments, and the technology behind the Bruker Vutara VXL.

Speaker
Winfried Wiegraebe, Product Manager Superresolution Microscopy, Bruker