TELEDYNE PHOTOMETRICS
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CUSTOMER REFERENCE

Prime 95B™ Scientific CMOS Camera

Light Sheet and Single Molecule Tracking

Dr. Martin Lenz, Senior Research Associate
Cambridge Advanced Imaging Centre (CAIC)
University of Cambridge

BACKGROUND

The Cambridge Advanced Imaging Centre (CAIC) at the University of Cambridge develops modern imaging techniques to answer some of the most pressing and challenging biological questions. Keeping in mind the needs and demands of biologists, one of the current developments is a localization based 3D super-resolution microscope. One of its applications include investigation of Notch pathway transcription factor dynamics in Drosophila salivary gland cells and mapping out the arrangement of chromatin inside Drosophila spermatocytes. Working in close collaboration with biologists requires CAIC to adapt and apply technological advancements in biomedical imaging to answer some of the most challenging questions in the field.

> “The high QE of the Prime 95B will allow us to improve our investigation of protein dynamics and extend single molecule tracking to more challenging samples.”

CHALLENGE

The research team uses single molecule tracking (SMT) to explore protein dynamics in living tissues of Drosophila and Zebrafish. A complete picture of different diffusing populations require images with high signal to noise ratio (SNR) at low excitation laser powers and short exposure times. One of the key points for achieving this is an efficient collection and detection of emitted photons.

To investigate the architecture of chromatin in Drosophila spermatocytes the team uses single molecule detection in combination with double-helix point spread function (DHPSF). This can give high-resolution in all three spatial dimensions. Losses in generating DHPSF and splitting the number of photons into two lobes of the DHPSF, requires highly efficient collection of single molecule emissions for this technique to be successful.

TELEDYNE IMAGING
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SOLUTION

Dr. Lenz, Senior Research Associate at CAIC shares, "The Photometrics Prime 95B will help us to progress in both SMT as well as chromatin mapping projects. The high QE of the 95B compared to other sCMOS cameras currently used by us, will allow us to improve our investigation of protein dynamics and extend SMT to more challenging samples."

Single molecule light sheet microscopy is one of the key applications for future work that will benefit the most from the increased sensitivity. For this application, the larger than usual pixel size of 11 µm together high quantum efficiency will be highly advantageous.

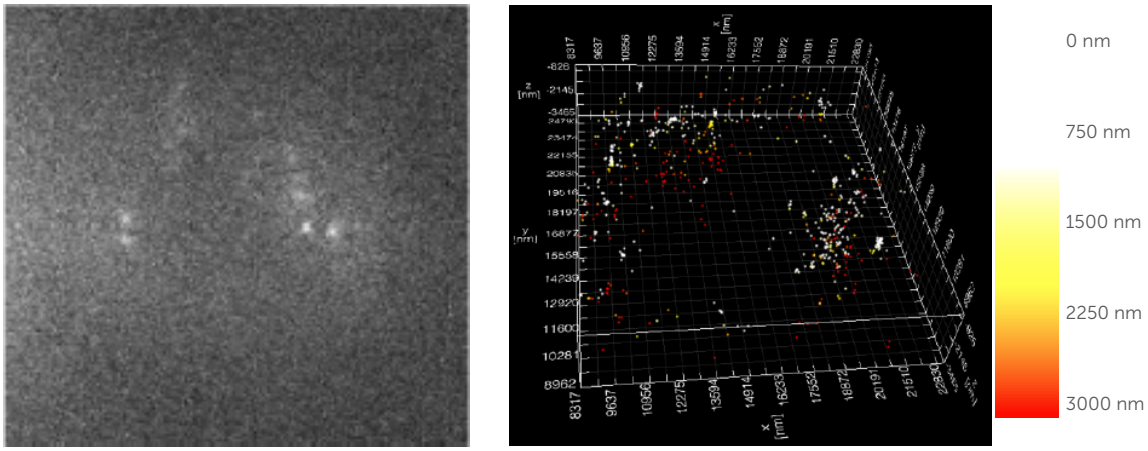

Figure 1: A) Raw image of spermatocytes using double-helix point spread function and **B)** 3D reconstruction from the raw data. Localizations in different colors represent their axial position.

Additional information is available at: https:/ /caic.bio.cam.ac.uk/

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