Contribution ID: **251** Type: **Invited speaker**

INVITED: Challenging the limits of detection technology to overcome society's most important challenges

Wednesday 28 June 2023 13:30 (30 minutes)

DECTRIS Ltd. was founded as a spin-off of Paul Scherrer Institut in 2006. At this time synchrotron and laboratory X-ray science were severely detector limited. The noise-free, high frame and count-rate performance of Hybrid Photon Counting (HPC) detectors not only overcame these limitations but has transformed X-ray science. In combination with an ever-increasing source brightness, improved optics, accurate and fast goniometry as well as novel software operating on fast computers, it enabled innovative applications such as in-situ and operando studies of real-life functional and materials and devices [1]. In 2016, inspired by the resolution revolution in single particle cryo-electron microscopy, largely driven by a new generation of MAPS detector [2], DECTRIS started the development of dedicated Hybrid Counting detectors for electrons.

The presentation will give an overview of development of the company from a spin-off to a successful SME (small & medium sized enterprise). The current detector family EIGER2 and its applications in high energy, high-resolution protein crystallography as well as operando studies will be discussed. The advantage of the use of fast, noise-free, high dynamic range detectors in electron microscopy will be illustrated with experimental results in EELS [3, 4], 3D electron diffraction [5] and cryo-electron microscopy [6]. Scanning transmission electron microscopy (STEM) is widely used for imaging, diffraction, and spectroscopy of materials down to atomic resolution. The ARINA detector is based on a new ASIC [7] custom developed to exploit the potential of 4D scanning transmission electron microscopy (4D STEM) in material and life sciences. First, promising experimental results demonstrate the advantages of recording the full scattering pattern at acquisition speeds and doses similar to conventional STEM imaging [8]. The presentation will conclude with an outlook on future detector.

[1] A Vamvakeros et al., NATURE COMMUNICATIONS | (2018) 9:4751
[2] W. Kühlbrandt, Science 343, (2014) 1443.
[3] B. Plotkin-Swing et al., Ultramicroscopy 217, (2020), 113067
[4] A.R. Ruiz Caridad et al., Micron 170, (2022), 103331
[5] P.B. Klar et al., bioRxiv preprint https://doi.org/10.1101/2022.09.15.507960
[6] Ch. Russo et al., in preparation, (2023)
[7] P. Zambon et al., Nuclear Inst. and Methods in Physics Research, A 1048 (2023) 167888
[8] D.G. Stroppa et al., Microscopy Today, Volume 31, Issue 2, 1, (2023) 10

Author: SCHULZE-BRIESE, Clemens (D)

Presenter: SCHULZE-BRIESE, Clemens (D)

Session Classification: Front-end Electronics and Readout

Track Classification: Invited Speaker