

Research Project

Hybrid pixel detectors for electron diffraction of nano-samples

Third-party funded project

Project title Hybrid pixel detectors for electron diffraction of nano-samples

Principal Investigator(s) [Abrahams, Jan Pieter](#) ;

Co-Investigator(s) [Stahlberg, Henning](#) ;

Project Members [Grüne, Tim](#) ; [Schmitt, Bernd](#) ; [Schulze-Briesse, Clemens](#) ;

Organisation / Research unit

Faculty of Science

Departement Biozentrum / Nano-diffraction of Biological Specimen (Abrahams)

Department

Project start 01.01.2016

Probable end 31.12.2016

Status Completed

We propose adapting the Eiger hybrid pixel detector developed at PSI and commercialised by the award-winning

Swiss company Dectris for measuring the atomic structure of nanometer sized samples by free electron diffraction. Our pilot electron diffraction studies with CERN-developed Timepix hybrid pixel detectors

with an Si sensor, indicate that Eiger detectors with a CdTe or GaAs sensor would ensure a major improvement in performance. Currently, Eiger detectors also have an Si sensor, like Medipix. The improvements

we propose will allow us to study 3D structures of molecules in atomic detail using only minute amounts of sample, including crystals of organic compounds that are only 20 nm in size. This will be a significant step forwards in mastering the molecular world at the sub-nanometer scale.

We will build an Eiger detector into a 300 kV electron microscope, and quantify its parameters for high-energy

electron detection (DQE as a function of resolution and dose). We will investigate how to optimally combine the Eiger design with a high Z sensor (GaAs or CdTe). We will validate our results in structural studies of weakly diffracting, radiation sensitive nano-samples (pharmaceuticals, protein nano-crystals, zeolites and other nano-particles), which currently can only be studied in bulk. We will test to what extent

the detector can be used for imaging of radiation sensitive samples using geometric superresolution. Our

project will result in a scientific instrument that can be developed by Dectris into a commercial product.

Keywords Nano-crystallography, Hybrid pixel detector, Electron diffraction

Financed by

Other sources

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