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Calibration of the AGIPD detector system at the European XFEL

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The Adaptive Gain Integrating Pixel Detector (AGIPD) is a hybrid pixel detector developed by DESY, PSI, and the Universities of Bonn and Hamburg for the European XFEL. The first 1 MPix system was installed in 2017 at the SPB beamline, and has been successfully used in the first user experiments. Several other AGIPD systems (1 MPix for MID, 1 MPix for HIBEF, and 4 MPix for SFX) are currently being constructed and installed at the European XFEL beamlines.

The AGIPD was designed to cope with the extraordinary requirements of the European XFEL beam structure. The detector features a high frame rate, large dynamic range, and single photon sensitivity. Each pixel utilizes an adaptive gain switching technique with three gain stages and contains 352 storage cells.

The size and complexity of the system results in more than a billion calibration constants for a 1 MPix detector. The constants are determined using a combination of dark and x-ray measurements and on-chip calibration sources. In this talk, we will present the calibration concept currently implemented for the 1 MPix system, the acquisition and analysis of several TB of calibration data, and planned improvements, as well as the challenges that will come along with the addition of the new of AGIPD systems.

Primary author: POEHLSEN, Jennifer (Deutsches Elektronen-Synchrotron DESY)

Co-authors: BECKER, Julian (DESY); DELFS, Annette (DESY); DINAPOLI, Roberto (Paul Scherrer Institut); GOETTLICHER, Peter (Deutsches Elektronen-Synchrotron (DE)); GRAAFSMA, heinz; GREIFFENBERG, Dominic (PSI - Paul Scherrer Institute); HIRSEMANN, Helmut (DESY); JACK, Stefanie (DESY); KLYUEV, Alexander (Deutsches Elektronen-Synchrotron); KRUEGER, Hans (University of Bonn); KUHN, Manuela (DESY); LAURUS, Torsten (DESY); MARRAS, alessandro (DESY); MEZZA, Davide (Paul Scherrer Institut); MOZZANICA, Aldo (PSI - Paul Scherrer Institut); SHEVIAKOV, Igor (DESY); SCHMITT, Bernd (Paul Scherrer Institut); SCHWANDT, Joern (Hamburg University (DE)); SHI, Xintian (Paul Scherrer Institute); SMOLJANIN, Sergej (DESY); TRUNK, Ulrich (DESY); ZHANG, Jiaguo (Paul Scherrer Institut); ZIMMER, Manfred (DESY)

Presenter: POEHLSEN, Jennifer (Deutsches Elektronen-Synchrotron DESY)

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