Helmholtz AMALEA Innovation Project.

The view at the Center for Free-Electron Laser Science

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June 3, 2020

HELMHOLTZ
RESEARCH FOR GRAND CHALLENGES

CFEL SCIENCE

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Data reduction at X-ray facilities

Motivation. Brightness of X-ray facilities, frame rate and number of pixels of 2D imagers keep increasing tremendously.

The resulting data rates and volumes are posing serious challenges on IT (network and storage), as well as on data-analysis.

Data reduction. Different vetoes can be exploited in the detector-to-storage path, simple and obvious – e.g. an intensity monitor – or complex and technique-dependent, where ML can come into play.

Machine learning. Techniques generating big data are SFX and SPI. For both, a crucial step is finding hits (meaningful events to be stored). This step can be improved exploiting ML, e.g. discriminating hits/flickering pixels, or assimilating the background. ML could also be used to sample the detector, discerning regions at full-resolution from areas that can be downsampled.