



iWoRiD 2022

## 23rd International Workshop on Radiation Imaging Detectors

26 – 30 June 2022

Riva del Garda, Italy

Contribution ID: 129

Type: **Oral**

### Correlated X-ray photons for incoherent diffraction imaging

*Tuesday 28 June 2022 15:30 (20 minutes)*

Established methods for high-resolution X-ray structure determination are based on far-field coherent diffractive imaging (CDI). However, in the interaction of light with matter incoherent processes occur, that are sometimes predominant over the coherent ones. They are considered detrimental in the CDI approach. The approach called incoherent diffractive imaging (IDI) opens up fundamentally new strategies for X-ray structure determination. It considers photon correlations of higher order rather than the photon distribution itself. Here, we show how IDI will be explored in a promising regime provided by nuclear resonances of Mössbauer nuclei. X-ray emission from excited states, i.e. incoherent nuclear resonant fluorescent radiation, will be employed. The experiment for incoherent nuclear resonant fluorescent radiation puts stringent requirements on the utilized pixelated detectors in terms of time and energy resolution. Detectors with sufficiently small pixel size of about 50  $\mu\text{m}$  and nanosecond time resolution are currently not available commercially. The detector based on Timepix4 readout chip being developed by the detector group at Deutsches-Elektronen Synchrotron (DESY) matches the required specifications.

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**Session Classification:** Applications