



IWoRiD 2022

23rd International Workshop on Radiation Imaging Detectors

26 – 30 June 2022

Riva del Garda, Italy

Contribution ID: 220

Type: Oral

INVITED: Spectral and phase-contrast imaging: from crystal-based synchrotron setups to detector-based compact systems

Tuesday 28 June 2022 14:00 (30 minutes)

Spectral and phase-contrast imaging techniques have been widely exploited at synchrotron radiation facilities. Their implementation requires in many cases the use of crystals either to prepare or to analyze the X-ray beam. For instance, energy dispersive spectral systems make use of multiple or bent crystal monochromators to spatially resolve different energy components at the detector position. Similarly, low-dose clinical applications require monochromators to select the X-ray energy that maximizes image quality for a specific diagnostic task. On the other hand, analyzer-based phase-contrast imaging employs an analyzer crystal to decode absorption, phase, and small-angle-scattering information encoded by the sample. In this context, spectral photon-counting detectors are key in the transition from synchrotrons to compact laboratory setups. The availability of photon-counting devices equipped with multiple thresholds and effective charge-sharing compensation circuitry allowed the implementation of quantitative spectral imaging at the micrometer scale and high energy to be performed in a compact laboratory environment. At the same time, their use combined with phase-contrast techniques with relaxed coherence requirements, such as edge-illumination, has boosted laboratory systems towards simpler experimental arrangements and combined spectral phase-contrast applications.

In this talk, an overview of some spectral and phase-contrast imaging techniques, applications, and related challenges is presented. A more in-depth discussion is dedicated to the development of a new compact experimental setup based on the edge-illumination technique and a spectral detector enabling spectral and phase-contrast imaging.

Presenters: BROMBAL, Luca; BROMBAL, Luca

Session Classification: Applications