

Present and Future Neutron Imaging Applications on DINGO at OPAL

Tuesday, 3 December 2019 14:25 (15 minutes)

The neutron imaging instrument DINGO is operational since October 2014 to support research at ANSTO. DINGO had a high subscription rate from a broad national and international scientific user community and for routine quality control for defense, industrial, cultural heritage and archaeology applications. DINGO provides a useful tool to give a different insight into objects because of different contrast compared to X-rays and high sensitivity to light elements. In the field of industrial application it has shown promising results for studying cracking and defects in concrete or other structural material. A major part of applications from both sides of the community, research and industrial user, was demanding the high resolution setup on DINGO and asking for an upgrade to achieve resolution below 25 μm pixel size.

In the original design DINGO could provide a minimum pixel size of 27 μm . The neutron beam size can be adjusted to the sample size from 50 x 50 mm^2 to 200 x 200 mm^2 with a resulting pixel size from 27 μm to ~100 μm . Depending on the sample composition a full tomography has been taken in 24 –36 hours with a 50 μm thin ZnS/6LiF-screen and the CCD (Andor IKON-L) camera. In a two stage upgrade the background radiation has been reduced by an additional slit system adjusting the beam size more flexible and further down to 0.5 x 0.5 mm^2 . The new system allows minimizing the beam according to the sample size. In combination with the Andor IKON SCMOS and Kenko distance rings, to increase the focal length of the existing 100mm lens the pixel size was reduced to 7 μm . The scintillator was a 10 μm thick Gadox screen and for each projection we have taken 3 –6 images for better white spot correction. We would like to present first radiography and tomography results using the new setup. A full tomography under these conditions can be taken in 2 -4 days depending on the nature on the sample.

In addition we have now a slit system installed to adjust the beam size even further to each individual sample. This new slit system reduces noise in form of white spots in the high resolution setup with small pixel size from 5- 20 μm by up to 70%. An overall range of pixel size from 5 μm to ~100 μm can be achieved now. The whole instrument operates in two different positions, one for high resolution and one for high speed.

We will show the performance of new the CMOS camera IRIS 15 with a 2960 x 5060 pixels chip and a physical pixel size of 4.5 μm . In combination with new scintillation screens like Gadox/LiF mixed screen it enables DINGO to run neutron tomography experiments with 5-10 μm resolution on large samples in a reasonable time of 24 -48 hours.

Level of Expertise

Expert

Do you wish to take part in the poster slam

No

Travel Funding

No

Speakers Gender

Rather not state

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Session Classification: Session 20

Track Classification: Imaging