
Contribution ID : **146** Type : **Oral**

# Quantifying the x-ray dark-field signal in single-grid imaging

*Wednesday, 24 November 2021 11:50 (15)*

X-ray imaging has progressed in recent decades to capture not only a conventional attenuation image, but also a 'phase-contrast' image that visualises those features that are difficult to see with attenuation. More recently, techniques have been developed to capture a 'dark-field' signal. The dark-field signal is generated by ultra-small-angle x-ray scattering from unresolved sample features, such as bubbles, powders or fibres, providing information about sample microstructure that is inaccessible using full-field conventional or phase-contrast x-ray imaging. Dark-field imaging can be useful in a range of fields, including medical diagnosis, materials science and airport screening.

Single-grid imaging is an emerging x-ray imaging technique that only requires one optical element – a grid or, in the speckle-based variant, a piece of sandpaper. The grid or sandpaper generate a reference pattern that is warped and blurred when the sample is introduced, revealing phase and dark-field respectively. This technique is suitable for dynamic imaging since the three complementary image signals can be extracted from single sample exposure, unlike previous methods. Until now, this technique has primarily been applied in phase-contrast imaging.

In this work, we derive a method to extract and quantify a dark-field signal from single-grid imaging, relating the signal to the number of sample microstructures. We also apply our method of analysis to images captured at the Australian Synchrotron's Imaging and Medical Beamline to evaluate how our measurements align with theoretical predictions. Future directions include investigating how the sample microstructure size affects the dark-field signal strength.

## Level of Expertise

Student

## Presenter Gender

Woman

## Pronouns

She/Her

## Which facility did you use for your research

Australian Synchrotron

## Students Only - Are you interested in AINSE student funding

Yes

## Do you wish to take part in the Student Poster Slam

Yes

## Condition of submission

Yes

**Primary author(s) :** HOW, Ying Ying; MORGAN, Kaye (Monash University)

**Presenter(s) :** HOW, Ying Ying

**Session Classification :** Instruments & Techniques

**Track Classification :** Instruments & Techniques