Contribution ID : **56** Type : **Poster**

Directional dark-field imaging: A new single-exposure technique to map and quantify sample microstructure

Conventional X-ray imaging non-invasively maps dense objects, likes bones, in an image. Dark-field x-ray imaging is an emerging technique which instead maps scattering from microstructures that are too small to individually resolve in an image. The phase-shifts from these structures can be collectively modelled as a scattering of the x-ray beam that smooths out local intensity variation in an image, and it is this blurring that we define as the dark field. Examples of dark-field producing microstructures include powders, foams, fibres or channels. By measuring the dark field, we can determine how scattering a sample is, and if the scattering is directional. Aligned elongated microstructures or fibres in a sample will create a dark-field signal that is stronger perpendicular to the direction of the structures. We have designed an approach where a grid pattern illuminates the sample, and sample-induced changes to that pattern are measured to extract the dark-field parameters, including the dominant scattering direction and the scattering angles in each direction. This directional dark field single grid retrieval algorithm that can be applied to experimental data to extract dark-field parameters and these parameters are quantitative and independent of the experimental set-up. As this technique only requires one sample exposure it allows for low dose and fast dynamic imaging which can be advantageous for dose sensitive and/or moving samples such as biological tissues or items moving along a convoy belt, coupling these benefits with the ability to extract information about sub-pixel microstructures. We show results from the Imaging and Medical Beamline, and anticipate this technique will also be possible on the MicroCT beamline.

Level of Expertise

Student

Presenter Gender

Woman

Pronouns

She/Her

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Session Classification : Poster

Track Classification : Biomedicine & Health