



Contribution ID : 7

Type : Poster

The progression of MIST: Multimodal Intrinsic Speckle-Tracking

Speckle-based phase-contrast X-ray imaging (SB-PCXI) is capable of reconstructing sample information below the imaging system's spatial resolution. Since its realisation in 2012 [1,2], there has been significant development in the experimental implementation and theoretical formalism of SB-PCXI. We have been investigating how the concept of "local energy conservation" can be used to reconstruct various signals from a sample- an approach termed Multimodal Intrinsic Speckle-Tracking (MIST). MIST combines the Fokker-Planck description of paraxial X-ray propagation [3] with a geometric-flow formalism for speckle-tracking [4] to consider both coherent and diffusive effects. We have developed several approaches in the quest to solve the SB-PCXI inverse problem [5-8]. This involves reconstructing quantitative and qualitative sample information from detector-measured intensity SB-PCXI data. Initial attempts to solve this inverse problem considered only the coherent channel of energy-flow, from which an algorithm to reconstruct a sample's projected-thickness was derived [5]. We currently present an algorithm capable of reconstructing the directional diffusive scattering signal from unresolved-microstructure [8]. This presentation will focus on the development of MIST, future research directions, as well as the wider application of SB-PCXI as a viable imaging technique.

- [1] Bérújon, S. *et al.* Phys. Rev. Lett. 108(15), 158102 (2012).
- [2] Morgan, K.S. *et al.* Appl. Phys. Lett. 100(12), 124102 (2012).
- [3] Paganin, D.M. *et al.* Sci. Rep. 9(1), 17537 (2019).
- [4] Paganin, D.M. *et al.* Phys. Rev. A, 98(5), 053813 (2018).
- [5] Pavlov, K.M. *et al.* Phys. Rev. Appl. 13(5), 054023 (2020).
- [6] Pavlov, K.M. *et al.* J. Opt. 22(12), 125604 (2020).
- [7] Alloo, S.J. *et al.* J. Med. Imaging 9(3), 031502 (2022)
- [8] Pavlov, K.M. *et al.* Phys. Rev. A, 104(5), 053505 (2021).

Level of Expertise

Student

Presenter Gender

Woman

Pronouns

She/Her

Do you intend to attend UM2022

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Yes

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Yes

Primary author(s) : ALLOO, Samantha (School of Physical and Chemical Sciences, University of Canterbury, New Zealand)

Co-author(s) : PAGANIN, David (School of Physics and Astronomy, Monash University); MORGAN, Kaye (Monash University); Dr PAVLOV, Konstantin (School of Physical and Chemical Sciences, University of Canterbury, New Zealand)

Presenter(s) : ALLOO, Samantha (School of Physical and Chemical Sciences, University of Canterbury, New Zealand)

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