Contribution ID: **198** Type: **Oral Presentations**

Perspectives on Breast Cancer Diagnosis Assisted by Convolutional Neural Networks Applied to High-Sensitivity Talbot-Lau Interferometric Imaging

Thursday 10 July 2025 12:30 (15 minutes)

Early detection of breast cancer remains a crucial objective in modern medicine. High-sensitive X-ray imaging based on Talbot-Lau interferometry offers enhanced soft-tissue contrast compared to conventional mammography, making it a promising tool for non-invasive diagnostics. This work explores the integration of Convolutional Neural Networks (CNNs) with high-sensitivity Talbot-Lau imaging to support and improve automatic tumor detection.

We propose a methodological approach consisting of three parts: pre-processing and filtering of raw images to enhance the contrast-to-noise ratio (CNR); classification of scattering images using a ResNet50 model to distinguish between tumors, calcifications, and fibrous tissue; and a precise segmentation of tumor regions using a U-Net architecture.

Experimental results demonstrate a significant improvement in both detection accuracy and lesion localization. These findings highlight the considerable potential of integrating advanced phase-contrast imaging with deep learning techniques as a possible decision-support tool for breast cancer screening and diagnosis.

Primary author: CIOBANU, Ionuț-Cristian (Horia Hulubei National Institute for Physics and Nuclear Engineering)

Co-authors: STUTMAN, Dan (Extreme Light Infrastructure –Nuclear Physics, Magurele, Romania); ANGHEL, Elena (Extreme Light Infrastructure –Nuclear Physics, Magurele, Romania); SAFCA, Nicoleta (Extreme Light Infrastructure –Nuclear Physics, Magurele, Romania)

Presenter: CIOBANU, Ionuț-Cristian (Horia Hulubei National Institute for Physics and Nuclear Engineering)

Session Classification: Biophysics, Life Sciences, Medical Physics

Track Classification: S02 –Biophysics, Life Sciences, Medical Physics