**Poster Presentation**

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*X-ray imaging of single semi-conductor nano-structures for photonics and electronics*

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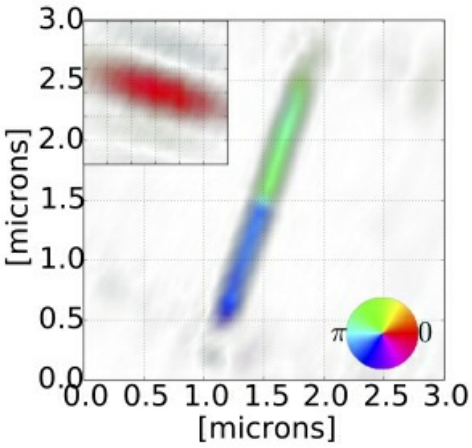
Coherent X-ray Diffraction Imaging (CXDI) has seen remarkable developments during the last 15 years, allowing not only to recover the 2D and 3D electronic density of single nano-objects with a resolution up to about 10 nm, but also (using the Bragg geometry) the inhomogeneous strain of deformed crystal lattices. This quantitative analysis can be performed either using standard CXDI [1], or using Ptychography, either in 3D or using the back-projection approach [2].

We will present studies of semiconductor nanostructures, firstly with 70 and 20 nm thick lines and islands made of strained silicon or silicon-germanium on insulator. In these samples the strain is used to enhance the conductive properties for electronic (transistor) applications. Secondly, we will present results on GaAs nanowire with embedded InAs quantum dots used as source for single photon emission.

Finally, we will discuss the future of X-ray coherent imaging techniques, which will become more accessible with the development of more user-friendly algorithms and software for data analysis [3], and the prospect of more brilliant sources giving several orders of magnitude improvement in the available coherent flux.

Figure caption: Reconstruction of a GaAs nanowire with an ~1.7 monolayer InAs insertion in Bragg geometry. The brightness corresponds to the amplitude, the colour to the phase of the complex image - corresponding to a ~0.027nm shift of the crystalline lattice. Inset: reconstructed X-ray probe.

[1] Robinson, I., Harder, R. (2009) Nat Mater. 8, 291
[2] Hruszkewycz, S.O., Allain, M., Holt, M.V., Murray, C.E., Holt, J.R., Fuoss, P.H. et al. (2016) Nat Mater. 21, 244
[3] Mandula, O, Elzo Aizarna, M, Eymery, J, Burghammer, M, Favre-Nicolin, V. (2016) J Appl Cryst., 49, 1842

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