



ID de Contribution: 266

Type: Poster

## Monochromatic sources of ions and electrons for nanosciences

Our projects aims at achieving breakthroughs in focused ion and electron beams, exploiting monochromaticity in the low-energy domain (eV-keV). Using ionization of a neutral atomic species and simultaneous production, detection and control of both the ion and the electron we propose to develop three innovative prototypes:

- 1) A focused ion beam using feedback control with unprecedented focused properties. This will be used to realize semiconductor circuit-editing at the (sub-)nm scale.
- 2) A deterministic source of (potentially) any type of ion for controlled implantation at the nm level. This will be used for on-demand doping of quantum devices.
- 3) A high-resolution electron-energy-loss microscope (HREELM) with precise knowledge of the electron energy and the position on the sample. It will be used to realize both imaging and vibrational spectroscopy for surface analysis.

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**Classification de Session:** Session Poster 2: MC1, MC4, MC8, MC10, MC12, MC14, MC20, MC21, MC23, MC24, MC25, REDP

**Classification de thématique:** MC8 Dernières avancées dans le domaine des technologies quantiques