



## SEMINAIRE ISMO

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### **Localized light emission and internal electric fields screening in GaN Quantum Discs within AlN barriers in Nanowires**

The presence of internal electric fields in quantum confining structures, like quantum wells and discs (QDiscs), has a major effect on their optical properties. Indeed, upon excitation, additional carriers in “off equilibrium” conditions will partially screen the electric field within the QDisc. This causes a reduction of the quantum confined Stark effect (QCSE) and shifts energy levels towards higher energies, depending on the carrier concentration.

Cathodoluminescence (CL) in a Scanning Transmission Electron Microscope (STEM) allows the deployment of very local excitation probes and the assessment of single QDiscs. Here we show a direct observation of very local emission of light from single GaN QDiscs formed between AlN barriers in the growth axis of GaN nanowires. Indeed, due to the height of AlN barrier, the diffusion length of carriers is as short as about 5 nm in this system.

Moreover, we show that the internal field can be screened by CL-generated charge carriers inside these QDiscs. CL spectral imaging with nanometre resolution tracks the emission of QDiscs as function of the electron probe position, allowing the creation of different concentrations of carriers in QDiscs. It is then possible to study energy shifts in individual QDiscs by observing different emission rates.

**Mardi 3 février 2015 à 11h**  
**Bât 210 – Amphi 1 (2<sup>ème</sup> étage)**  
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