Seminar – Friday November 12th, 10.00 h. Aula III (Trilingüe)

Imec's AttoLab: Bridging the Gap Between Fundamental Ultrafast EUV Science and Practical Metrologies for the Semiconductor Industry

Kevin Dorney – AttoLab, *imec*, (Leuven - Belgium)

Underlying mechanism of gas-phase HHG is well understood and it is now known that the quantum physics behind the HHG process can be exploited to tailor the spectral, temporal, spatial, and angular momentum properties of the emitted short-wavelength light.

In parallel, advancements in HHG system design have now resulted in robust, bright, and near turn-key systems for producing tunable, coherent EUV light for advanced metrology applications.

imec has recently installed and commissioned the imec AttoLab, a first-of-its-kind, ultrafast, HHG-based EUV metrology and lithography lab with primary aims of performing high-NA EUV lithography and ultrafast materials characterization.

An overview of imec's AttoLab, its infrastructure, and the current and foreseen ultrafast spectromicroscopies that will be deployed for characterization of novel semiconductor materials will be given. In addition to spectroscopy and imaging capabilities, the lithographic capabilities of AttoLab will be presented, as well as the first interference lithography results obtained with a 13.5 nm, HHG-based EUV system. Finally, I will give some perspectives and outlook on how HHG-based light sources can further benefit semiconductor metrology and lithography, in particular to the use of structured EUV light for advanced inspection and metrology of devices and materials.

Kevin Dorney is a postdoctoral researcher and MSCA fellow in AttoLab at imec in Leuven, Belgium. In 2019, he earned a Ph.D. in Chemical Physics under the supervision of Profs. Margaret Murnane and Henry Kapteyn in JILA at the University of Colorado Boulder, specializing in the HHG-based generation of structured EUV beams with tailored spin and orbital angular momentum.

His current research interests involve the deployment of bright, coherent 13.5 nm EUV light from HHG systems to investigate the ultrafast radiochemistry of the EUV exposure mechanism in photoresists, as well as their use in lithographic processes for resist screening and advanced metrologies to facilitate learning cycles as the semiconductor industry transitions to high-NA EUV lithography.

European Research Council
Established by the European Commission

"**ATTOSTRUCTURA** has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement No 851201)".

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