Spécialité de Master « Optique, Matière, Plasmas »

Stage de recherche (4 mois minimum, à partir de début mars)

Proposition de stage (ne pas dépasser 1 page)

Date de la proposition :

Responsable du stage / *internship supervisor*: Prof.Dr.W.Ubachs			
Nom / *name*:	Ubachs	Prénom/ *first name* :	Wim
Tél : +31205987948		Fax :	
Courriel / *mail*:	w.ubachs@arcnl.nl		
Nom du Laboratoire / *laboratory name*: Advanced Research Center for Nanolithography			
Code d'identification :		Organisme :	
Site Internet / *web site*: www.arcnl.nl			
Adresse / *address:* Science Park 104, 1098 XG Amsterdam, The Netherlands			
Lieu du stage / *internship place*: ARCNL in Amsterdam			

Titre du stage / *internship title*: EUV plasma dynamics and fundamental (laser) spectrometry: nanolithography

Résumé / *summary*

The research group EUV Plasma Dynamics at ARCNL (Advanced Research Center for Nanolithography) investigates the production of 13.5 nm EUV-radiation in laser-produced plasma (LPP) sources at a fundamental level. This research is of great importance for the new generation of lithography machines of the world-leading company ASML.

We study the plasma dynamics of the LPP and the microscopic properties of the particle species produced when the plasma is formed. This includes the formation of highly-charged tin (Sn) ions up to Sn13+, debris molecules, clusters, and nanoparticles as well as their interactions.

All experiments, diagnostics and exploration of alternatives will be performed on a low-frequency (10 Hz) tin-droplet simulation tool (see Figure). A range of instruments will be installed to diagnose the tin-plasma: EUV, DUV, optical and IR spectroscopes, mass spectroscopy for the charged particles, and active laser-diagnostics such as laser induced fluorescence (LIF), charge-exchange recombination spectroscopy and beam emission spectroscopy (CXRS and BES), cavity ring-down (CRD) absorption, fragment-production, Rayleigh-Mie-Thomson scatterometry for the neutrals and nanoparticles. Time resolved high-resolution spectroscopy of the active highly charged ions (HCI) in the plasma will be performed in the EUV (near 13.5nm) as well as in the optical domain. Also, using electron beam ion traps (EBIT), the fundamental properties of these, and other interesting HCI can be studied in a controlled setting. Interpretation of the photon spectra coming from the plasma requires the basic fingerprints of atomic and photonic interactions. Collecting the appropriate set of fingerprints in experiments at external facilities, such as synchrotrons, highly-charged ion labs, and storage rings is part of the interpretation effort.

We can offer financial support for housing and travel for master students, and also offer several PhD positions at full salary.

Group leaders:

Prof. Dr. W.Ubachs
Prof. Dr. Ir. R.A. Hoekstra
Dr. Versolato

Toutes les rubriques ci-dessous doivent obligatoirement être remplies

Ce stage pourra-t-il se prolonger en thèse ? *Possibility of a PhD* **? : YES**

Si oui, financement de thèse envisagé/ *financial support for the PhD*: **YES**

Lasers, Optique, Matière	**YES**	Lumière, Matière, Interactions	**YES**
Plasmas : de l'espace au laboratoire	**YES**		

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