

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 : 5/12/2012

Responsable du stage / internship supervisor:	
Nom / name: Goudail Tél : 01 64 53 31 95 Courriel / mail: Francois.goudail@institutoptique.fr	Prénom/ first name : François
Nom du Laboratoire / laboratory name: Laboratoire Charles Fabry	
Code d'identification : LCF UMR 8501	Organisme : SPIIm team
Site Internet / web site: http://www.lcf.institutoptique.fr	
Adresse / address: Institut d'Optique	
Lieu du stage / internship place: Institut d'Optique	

Titre du stage / internship title: Automation of a polarimetric camera : coupling innovative imaging system with image processing algorithms
<p>Polarimetric imaging consists in measuring the polarization state of the light coming from a scene. It can reveal contrasts that are not visible in classical images and has many applications in remote sensing, medical imaging, or industrial control [1]. Our team has designed and built an active polarimetric imager based on electrically controllable liquid-crystal (LCD) polarization modulators. This system can for example significantly improve vision through diffusive media [2,3].</p> <p>Our team is the leader of a research/industrial project consisting in developing a polarimetric imager with improved capabilities that integrates digital image processing algorithms and operates in the near infra-red band. This project is made in collaboration with the company Thales Research and Technology and the Fresnel Institute, in Marseille. The person recruited for this internship / PhD is to take a central part in this project.</p> <p>The aim of the project is to fully automatize the real time imager's optimization process. This presents a double challenge: in terms of image processing, to design the algorithms that make automation possible, and in terms of instrumentation, to integrate the imager with the image processing algorithms in a complete system. The project will have the following objectives:</p> <ul style="list-style-type: none">• Design of image processing (segmentation) algorithms to automate polarimetric contrast optimization.• Implementation on the imaging systems by integrating the algorithms and the acquisition (LCD and camera driving) with Labview and Matlab.• Validation and performance assessment of the automated system on real-world imaging scenarios : imaging through diffusive media, multispectral imaging, coherent imaging ... <p>During the internship, the student will thus develop skills in polarization measurements, optoelectronic system design and optimization, data and image processing algorithms.</p> <p>[1] F. Goudail, J.S. Tyo, "When is polarimetric imaging preferable to intensity imaging for target detection?", J. Opt. Soc. Am. A, 28, (2011)</p> <p>[2] G. Anna, F. Goudail, D. Dolfi, "Polarimetric target detection in the presence of spatially fluctuating Mueller matrices", Opt. Lett., 36 (2011)</p> <p>[3] G. Anna, N. Bertaux, F. Galland, F. Goudail and D. Dolfi, "Joint contrast optimization and object segmentation in active polarimetric images", Opt. Lett., 37 (16), 3321-3323 (2012).</p>

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: DGA	
Lasers et matière	Lumière, Matière : Mesures Extrêmes
Optique de la science à la technologie	X Plasmas : de l'espace au laboratoire