

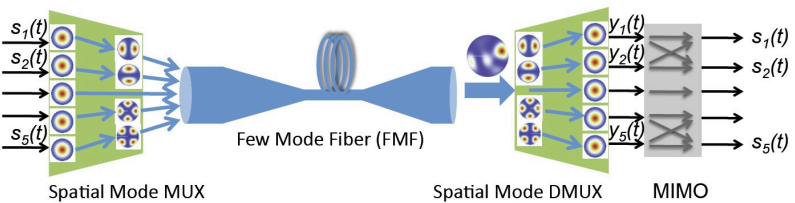
Spécialité de Master « Optique, Matière, Plasmas »

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:			
Nom / name:	DUBREUIL	Prénom/ first name :	Nicolas
Tél :	01 64 53 34 61	Fax :	
Courriel / mail:	Nicolas.dubreuil@institutoptique.fr		
Nom du Laboratoire / laboratory name: Laboratoire Charles Fabry			
Code d'identification :	UMR 8501	Organisme :	Institut d'Optique – CNRS - U PSud
Site Internet / web site:	https://www.lcf.institutoptique.fr		
Adresse / address:	2 Av. Augustin Fresnel, 91127 Palaiseau		
Lieu du stage / internship place:	PALAISEAU		

Titre du stage / internship title: Manipulating the optical coherence of spatial-division-multiplexed signals in multimode fiber transmission systems	
Résumé / summary	
<p>In order to satisfy the continuing growth of data network traffic, optical fiber communication systems have developed various technologies to increase their capacity: wavelength-division multiplexing (WDM), polarization-division multiplexing (PDM), digital coherent detection associated to high-order modulation (in phase and amplitude) formats. However, recent studies showed that the capacities of these communication systems are about to reach the fundamental Shannon limit. To overcome this limitation, space-division multiplexing (SDM) systems are envisioned, which consist in transmitting the information through several “space channels” (either isolated or coupled) as illustrated in the Figure. Their capacity is expected to grow with the number of space channels.</p>	
	
<p>Our project addresses the issue of communication system capacities. It is focused on the potentialities offered by the spatial-division multiplexing (SDM) in multimode optical fibers. Whereas each mode can be seen as one individual space channel, transmission impairments are caused by unavoidable cross-talk between the spatial modes. A MIMO (Multiple Input Multiple Output) digital signal processing is then required to recover the input data.</p>	
<p>Our objective is to study a novel approach for the processing of the transmitted optical data, in order to simplify the digital signal processing scheme whose complexity scales with the square of the space channel numbers! By directly manipulating the optical coherence properties of the transmitted beam, we intend to strengthen the information content for each spatial mode, enabling a performance improvement of the transmission. In the past, two-wave mixing schemes have shown their capabilities in enhancing, or even extracting, temporal data channels carried by a collection of spatial modes. Based on these tools, we plan to realize full self-organizing systems able to automatically separate the data channels.</p>	
<p>Following a first experimental demonstration of these principles, we plan to demonstrate that a non-linear optical processor can efficiently separate data channels being carried by a set of coupled spatial modes.</p>	
<p>The project will be conducted in collaboration with Telecom Sud-Paris and Alcatel-Lucent Bell Labs.</p>	
<p>Toutes les rubriques ci-dessous doivent obligatoirement être remplies</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: CIFRE with Alcatel-Lucent Bell Labs			
Lasers, Optique, Matière	X	Lumière, Matière, Interactions	X
Plasmas : de l'espace au laboratoire			

Fiche à transmettre (fichier pdf **obligatoirement**) sur le site <http://stages.master-omp.fr>