**Titre/Tittle:**
4D imaging of the blood microcirculation by Digital Holographic Microscopy DHM

**Nom du Laboratoire/Laboratory Name:** (vous pouvez insérer votre logo)
Laboratoire Charles Coulomb: UMR -5221_CNRS-Université Montpellier. Montpellier FRANCE

**Sujet de Post-doc/ subject Post-doc:**
The post doc position is available for a period of one year in the soft material team of laboratory Charles Coulomb in Montpellier. Supervision is provided by a physicist/ optician (Michel Gross) and a biologist (Daniel Alexandre), members of this team. This project proposes the development of holographic techniques for in vivo microscopy, studying in particular the micro circulation in the zebrafish embryo [1]. This embryo, whose circulation is easily observable, is a vertebrate model, commonly used by biologists.

Digital holography constitutes an ideal detector scheme that acquires all the information of the optical field scattered by an object. It is then possible to select by digital filtering the useful and relevant information. Here, experiments were performed by selecting the signal diffracted by the red blood cells that are in motion, and by imaging, at each time $t$, the position of the red blood cells in three dimensions ($x,y,z$). 4D images ($x, y, z$ and $t$) of the microcirculation are thus obtained [2,3]. The interest of the method for biologists is to enable three-dimensional imaging without scanning or optical sectioning so that the microcirculation is imaged simultaneously at any point without the need for injection of tracer or genetic manipulation.

The task of post doc is to develop and improve the existing experimental and improve calculation procedures.

**Reference**
1) N. Verrier, D. Alexandre and M. Gross “Laser Doppler holographic microscopy in transmission application to fish embryo imaging” Optics express 22 (8), p9368–9379 (2014)
3) D. Donnarumma, A. Brodoline, D. Alexandre and M. Gross. “4D holographic microscopy of zebrafish larvae microcirculation” Optic Express (to be published) (2016) https://hal.archives-ouvertes.fr/hal-01363227v1

**Compétences/Required skills :**
Applicants must hold a PhD degree in the closely related area (physics, optics, or biomedical engineering) prior to the start-date of the position. Applicants with PhD degrees in electrical engineering with interdisciplinary experiences and complementary expertise in the areas of optics, biophysics, microbiology are also highly encouraged to apply. Experiences and expertises in following areas: optics, microscopy, numerical techniques in C/C++ and with GPU, computational imaging, modern coherent optics and holography are also welcome.

**Contact:**
Nom/Name : GROSS
Prénom/FirstName: Michel
Email : michel.gross@umontpellier.fr
Téléphone/Phone number: +33 6 09 42 20 51