

Research Grants for PhD students from the China Scholarship Council

Information Form (please read the guidelines carefully on the website www-csc.utt.fr)

Supervisor's name : ZENG Given names : Shuwen

Status (prof., assistant prof., ...) : Chargée de recherche CNRS

Laboratory : Light, nanomaterials, nanotechnologies (L2n), CNRS Website address : l2n.utt.fr

Institution : University of Technology of Troyes Website address : www.utt.fr

Scientific competence of the supervisor:

Optics, Plasmonics, Photonics

Two major publications in the field proposed for the PhD :

1. Zeng, S. et al. New Journal of Physics 26, 023053 (2024)
2. Zeng, S et al. Opt. Express 31, 30863-30875 (2023)

Website address of the personal page : <https://recherche.utt.fr/research-directory/mme-shuwen-zeng>

Supervisor's email : shuwen.zeng@utt.fr

Description of the research work proposed for a PhD

Topic # (see list) : 1.3

Title : Theoretical and numerical modeling of particle scattering in complex disordered media

Subject :

The PhD student will develop scalable numerical models to analyze multiple scattering, transmission, light field redistribution, and optical localization in dense random systems. Rather than relying solely on computationally expensive full-wave simulations, the work will emphasize physically interpretable and computationally efficient approaches for describing light transport in stochastic and heterogeneous environments. This step aims to provide a rigorous basis for understanding how disordered media transform incident optical fields and how such transformations can be predicted and exploited. His/her expertise in this field of 3D optical modeling with customized algorithms will be complementary to the activities that we carry out within the L2n Lab of UTT/CNRS. This approach will allow us to accurately model and decode full-wave propagation in multi-layered complex systems, effectively circumventing the prohibitive computational costs and memory bottlenecks inherent to conventional volumetric grid-based simulations (such as FDTD or FEM). By applying this highly efficient numerical model to deterministically control light-matter interactions, we aim to achieve more advanced high-sensitivity imaging and detection of microscale biological targets—such as protein molecules, biomarkers, or other small bioparticles—hidden deep within highly scattering and complex biological samples.

Keywords :

Optics, Plasmonics, Photonics

Expected collaborations :

Nanyang Technological University (Singapore)

Background required from the applicant :

A solid knowledge in physics, in particular optics, photonics and plasmonics.

Existence of a PDF file detailing the proposal ("yes" or "no") : no

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