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| **Supervisor(s) names:** | Dr Jani Bolla, Prof. Paul Jarvis, Prof. Carol Robinson and Prof. Peijun Zhang |
| **Department(s)/Organisations:** | Biology, Chemistry and Diamond Light Source |
| **e-mail:** | Jani.bolla@biology.ox.ac.uk |
| **Tel:** | 01865275147 |
| **Project Title:** | Native architecture of the chloroplast protein-import channel |

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| **Brief description of project:** Protein translocation across membranes is a vital cellular process; however, the exact mechanism by which this occurs is not well understood. In the eukaryotic organelles, mitochondria and chloroplasts, which perform metabolic processes essential to viability, growth, development and adaptation, the vast majority of proteins are nuclear-encoded and synthesised as preproteins on cytosolic ribosomes. The preproteins are then recognised by sophisticated molecular machineries to facilitate their import into the organelle. In chloroplasts, protein import is accomplished by translocases of the chloroplasts' outer and inner membranes, termed TOC and TIC, respectively. These translocases are multimeric protein complexes and present in all plants, and some of the main components are also well-conserved in apicomplexan parasites, for example, *Plasmodium falciparum* which causes malaria. The key players involved in preprotein recognition and import of the chloroplast TOC-TIC system have recently been described; however, the composition of the TIC complex is largely still under debate. Moreover, the structural organisation of the TOC-TIC complexes remains elusive. A complete understanding of how these complexes assemble and function will then enable us to modify plants to increase crop yields to meet the growing population's needs, which is set to reach 9 billion by 2050.This project aims to decipher the mechanisms of protein transport by the TOC-TIC system at a molecular level directly from native membranes. This project is very timely with the recent developments made in native mass spectrometry and cryo-tomography techniques, where samples are analysed directly from the native lipid environment without chemical disruptions.  |
| **Attributes of suitable applicants:** This project would suit a candidate with a background in biochemistry, and an aptitude for learning structural biology.  |
| **Funding notes:** Oxford BBSRC Bioscience DTP and Diamond Doctoral Studentship ProgrammeThis project is funded for four years by the Biotechnology and Biological Sciences Research Council UKRI-BBSRC and Diamond Light Source Ltd. UKRI-BBSRC eligibility criteria apply (<https://www.ukri.org/files/funding/ukri-training-grant-terms-and-conditions-guidance-pdf/>). Successful students will receive a stipend of no less than the standard UKRI stipend rate, which will be £20,198 for the academic year 2023/24.*This project is supported through the Oxford Interdisciplinary Bioscience Doctoral Training Partnership (DTP) studentship programme. The student recruited to this project will join a cohort of students enrolled in the DTP’s interdisciplinary training programme, and will participate in the training and networking opportunities available through the DTP. For further details, please visit* [*www.biodtp.ox.ac.uk*](http://www.biodtp.ox.ac.uk)*. The DTP and its associated partner organisations aim to create a community that is innovative, inclusive and collaborative, in which everyone feels valued, respected, and supported, and we encourage applications from a diverse range of qualified applicants.* |