**University of Leicester**

**BBSRC MIBTP Studentship Project 2024-5 entry.**

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| **Project Reference** |  |

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| **Additional Supervisor** |  |

**Section 2 – *Project Information***

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| **Project Title** | Revealing Reactivity in Cancer-Associated Heme Proteins: Novel Time-Resolved Structural Approaches  |
| **Project Summary**  |
| Indoleamine 2,3-dioxygenase 1 (IDO1) is a heme-containing enzyme involved in the degradation of tryptophan to kynurenine. Cancer cells upregulate IDO1 to escape normal immune responses and, in many cases, a high expression of IDO1 is connected to poor prognosis. Understanding the precise mechanisms by which IDO1 modulates these processes is of paramount importance for therapeutic development and a deeper comprehension of immune homeostasis.  This project aims to investigate the catalytic mechanism and structural dynamics of IDO1 using cutting-edge structural and spectroscopic techniques, and computational analysis. Spectroscopy offers a powerful means to probe the intricate molecular events occurring during IDO1 catalysis in real-time. A combination of X-ray and time-resolved vibrational spectroscopic methods will be used to probe mechanistic details of IDO1. These methods will provide critical data on catalytic timescales that will feed directly into cutting-edge time-resolved structural studies. The outcomes promise to extend our understanding of this crucial enzyme and its implications in health and disease, with potential far-reaching impacts in immunology and drug discovery. A PhD student will gain a broad range of interdisciplinary skills in structural biology, chemical biology and biophysics in order to address an important question in cancer biology.   Techniques that will be undertaken during the project* Molecular Biology (cloning & mutagenesis)
* Protein expression and purification (bacterial and mammalian)
* Enzyme kinetics
* Protein crystallisation
* Structure determination
* X-ray Spectroscopy
* Time-resolved spectroscopy (infrared, Raman)
* Synchrotron science
* Chemical synthesis
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| **References** |
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**To apply please refer to**

[**https://le.ac.uk/study/research-degrees/funded-opportunities/bbsrc-mibtp**](https://le.ac.uk/study/research-degrees/funded-opportunities/bbsrc-mibtp)