



**Title: Funded MPhil Studentship**

**School/Department: Physics and Astronomy**

**Supervisors: Prof George Fraser / Prof Richard Willingale**

**Start Date: 2nd January**

**Entry Requirement: UK/EU only – first degree (BSc) obtained in last three academic years only**

**Closing Date: Open until filled – beginning 2014 placement desired**

## **12 month MPhil Research Studentship evaluating and modelling the performance of a portable X-ray imaging system**

**Available starting January 2014 funded by the University of Leicester, ERDF and 3DX-RAY Ltd.**

Applicants are invited for a 12 month MPhil studentship available in the area of X-ray Physics and X-ray imaging as part of collaboration between the Physics and Astronomy Department, at the University of Leicester and 3DX-RAY Ltd., a global market and technology leader in line-scan X-ray imaging systems for the security and industrial inspection markets. This MPhil is funded by the European Regional Development Fund (ERDF) - IRSA grant, University of Leicester and 3DX-RAY Ltd. The studentship will cover a standard maintenance grant for 12 months and a small amount for research expenses and travel. Full University student fees for UK/EU students for 12 months will be covered by 3DX-RAY Ltd.

### **Project Overview**

Evaluation, modelling and improvement of a portable X-ray imaging system: The aim is to identify the parameters that limit the performance and investigate modifications to the system that could improve the performance. The Company will provide the student with full access to a range of portable X-ray imaging systems (FlatScan-TPXI and Flatscan 15) and suitable radiological chambers in which to conduct live data acquisition experiments.

### **Project Description**

Important factors of interest are the penetration, contrast and physical resolution that the X-ray imaging system can deliver. These are driven by the physical interaction of the X-rays with the target and the system and the detailed system design. The research is expected to address the following key questions:

- What are the important parameters that characterise the performance?
- What factors are limiting the performance?
- How can the system be altered to improve the performance?

### **Objectives**

- To set up a model of the X-ray imaging system that includes all the important factors that determine and limit the performance.
- To evaluate the performance of existing X-ray imaging systems and incorporate real performance data into the system model.
- To use the system model to investigate possible changes to the system that can improve the performance.

### **Deliverables**

- Quantitative analysis of the most significant factors affecting system performance in ranked order.
- Verified (against experimental data) model for each of the top 3 influencing parameters





- Predictions from the models of the theoretical limits of performance for the system

#### **Specific Task Description**

- Software modelling using a combination of in-house and commercial software packages
- Data acquisition from existing X-ray imaging systems
- Extraction of physical X-ray data from publically available databases
- Analysis of the current system performance and prediction of improved performance using the software tools and data from above

#### **Entry Requirements**

Applicants (UK/EU only) should have obtained a I or II(i) honours BSc degree in Physics, Engineering, or a related discipline in the last three years (2011, 2012, 2013). Applications should include a covering letter and a detailed CV, together with the names and addresses of two referees.

Complete the university online application at:

<http://www2.le.ac.uk/study/research/how-to-apply/online>

Details of IRSA can be found at:

<http://www2.le.ac.uk/business/collaborations/support/irsa/irsa-innovation-through-the-research-support-accelerator>

For informal inquires and details on how to apply please contact Professor R. Willingale  
[zrw@le.ac.uk](mailto:zrw@le.ac.uk) 0116 252 3556

#### **Experience to be gained**

This project is a combination of practical physics, data analysis, software modelling and technology development and would provide the student with experience of X-ray physics and X-ray imaging applicable in many areas including security, industrial inspection and medicine. 3DX-RAY Ltd. are potentially open to offer employment at the end of the project.

Applicant will be working a minimum of 2 days per week with the company to gain in-house experience and skills. Consequently, the ability to drive to the site is useful; however, this is not essential as it is accessible by public transport.

3DX-RAY Ltd Address:

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