Modelling state of the art magnetic systems for Heat-Assisted Magnetic Recording

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Research Centre or Department: Department of Engineering and Mathematics

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Project summary

This internship aims to provide a candidate with a scientific background and an interest in computational research the opportunity to engage in a project on future magnetic storage technology. The project will be embedded in an ongoing collaboration with industry partners.

The volume of data being stored and processed globally has risen exponentially, driven in part by the surge in our online presence and the prevalence of cloud storage. This continued growth requires developing new technologies with higher density storage while improving energy-efficiency to contribute to net-zero targets.

Heat-Assisted Magnetic Recording (HAMR) addresses this challenge by using a laser to heat a tiny area on the magnetic disk where data is being written. Data is typically stored on magnetic granular media with individual grains (representing the bit states) of the order of 10nm.

The project will consist of numerical simulations to explore the impact of various parameters on HAMR performance, including grain size, laser power, media composition, and recording density.

The project will utilise start of the art techniques such as the Landau-Lifshitz-Bloch (LLB) model and existing open-source software such as VAMPIRE and MARS.

During the internship the applicant will gain extensive training and develop knowledge in:

1) Proficiency in computational modelling and simulation techniques including experience in utilizing high-performance computing resources and familiarity with Linux-based systems for job submission, scripting, and data analysis.

2) Understanding of magnetic recording principles and HAMR technology.

3) Strong problem-solving skills in optimizing parameters for improved HAMR performance.

4) Scientific Research Methodology: Engaging in literature review, knowledge of model development, parameter optimization, and data analysis.

Specific skills and experience required for this project

Please also refer to the advert on our jobs pages for the person specification for these internships

The project will be based on computational modelling and would help develop skills to support a future postgraduate degree. Interested candidates should have a background in a scientific discipline and an interest in computational research or magnetic materials.

Prior knowledge of high-performance computing is desired but not essential. Some basic knowledge of programming languages such as Python, C++, Fortran, MATLAB is required.

Prior knowledge of magnetism or magnetic particles is not essential, but knowledge or interest in a physics-based project would be required.

Project location

City Campus/Collegiate Campus/AWRC

Home working may be available.

Project delivery

The project could be done both full-time and part time. Funding is available for 6 weeks full-time or an equivalent duration part-time. For part-time would require at least of the equivalent of full 2.5 days per week (alternative number of hour per week can be discussed in advance).