

Physics

Lancaster
University



Ref: 0156-26

Job Title: Postdoctoral Research Associate/Senior Research Associate in Terahertz Switching of Magnetic Materials

Department: Physics

Salary: Grade 6/7 £33,002 to £46,049

Closing Date: 8th May 2026

Contract Type: Indefinite with an end date

The Department of Physics at Lancaster University invites applications for a Post-Doctoral Research Associate (or Senior Research Associate) to work in the field of ultrafast switching of magnetism. The post is funded by Green Future Fellowship project: Terahertz magnetic recording for green data storage technology. We're looking for people who have a passion for science, with ambition to apply their own ideas, perspectives, and their personal skillset to the discovery new spin switching scenarios and development of ultrafast magnetic recording technology. We'd like you to be part of the team that helps drive translation of energy efficient data storage to commercial success.

The advent of artificial intelligence and the proliferation of cloud-based technologies call for denser, faster and more energy efficient data processing and storage. However, the heat produced by modern data centres has already become a serious limitation to further increase their performance. At present, the data industry lacks a solution for this problem, which in future may contribute greatly to the global warming and energy crisis. This project aims to pave a way towards a memory-device characterized by very low energy consumption and switching times of one trillionth of a second. Very short pulses of electro-magnetic radiation at terahertz frequency (i.e. thousand times faster than that in current data communication and processing standards) are among the shortest stimuli available. These pulses are made from light particles, photons, with their energies naturally matching those of elementary quantum magnets, "spins", which are used to store information in the magnetic memory. Hence, such terahertz photons can selectively excite spins on their own energy scale without releasing any significant heating into the surrounding medium. Furthermore, the terahertz excitation of the spins is expected to be strong enough to induce switching of the spins' orientations, representing an elementary act of writing a bit of information within a magnetic data storage device.

The position offers access to state-of-the art ultrafast laser facilities and challenging research project at the interface of photonics and magnetism. You will contribute to solving the existential challenge to the humankind: excessive energy consumption by data-intensive technologies such as Artificial Intelligence, Internet of Things and cloud computing.

Successful candidates will hold a PhD in experimental physics in a field related to this project. Training in unique experimental techniques will be provided, but we expect you to have prior experience of one or more of the following areas:

- Ultrafast pump-probe spectroscopy;

- Terahertz photonics;
- Magnetic and/or spintronic materials;
- Optical measurements at cryogenic temperatures;
- Near-field microscopy and nanoscopy.

The post is available immediately and is offered for 24 months at the first instance. The further extension of the post is possible subject to performance.

About Green Future Fellowship programme:

<https://raeng.org.uk/green-future-fellowships>

<https://www.lancaster.ac.uk/physics/about-us/news/green-future-fellowship-for-lancaster-physicist>

Key publications:

[1] R. A. Leenders, O. Y. Kovalenko, Y. Saito, N. R. Vovk, A. V. Kimel, and R. V. Mikhaylovskiy. THz-driven spin dynamics in orthoferrites with Kramers and Non-Kramers rare-earth ions. *Phys. Rev. Lett.* 135, 246703 (2025). <https://doi.org/10.1103/ldnx-67qz>

[2] R. A. Leenders, D. Afanasiev, A. V. Kimel and R. V. Mikhaylovskiy. Canted spin order as a platform for ultrafast conversion of magnons. *Nature* 630, 335 (2024). <https://www.nature.com/articles/s41586-024-07448-3>

[3] S. Schlauderer, C. Lange, S. Baierl, T. Ebnet, C. P. Schmid, D. C. Valovcin, A. K. Zvezdin, A. V. Kimel, R. V. Mikhaylovskiy and R. Huber. Temporal and spectral fingerprints of ultrafast all-coherent spin switching. *Nature* 569, 383 (2019). <https://www.nature.com/articles/s41586-019-1174-7>

[4]. S. Baierl, M. Hohenleutner, T. Kampfrath, A. K. Zvezdin, A. V. Kimel, R. Huber, and R. V. Mikhaylovskiy. Nonlinear spin control by terahertz driven anisotropy fields. *Nature Photonics* 10, 715 (2016). <https://www.nature.com/articles/nphoton.2016.181>

About Lancaster University:

Lancaster University is consistently ranked in the top 10 in the UK university league tables. It is located on a beautiful campus in the North-West of England close to the Lake District National Park.

The Department of Physics is committed to family-friendly and flexible working policies on an individual basis, as well as the Athena SWAN Charter, which recognises and celebrates good employment practice undertaken to address gender equality in higher education and research. We are also strongly committed to fostering diversity within our community as a source of excellence, cultural enrichment, and social strength. We welcome those who would contribute to the further diversification of our department.

Informal inquiries:

If this opportunity interests you, and you'd like to know more—or if you're unsure whether your experience is the right fit—we encourage you to contact the principal investigator directly: Dr Rostislav Mikhaylovskiy r.mikhaylovskiy@lancaster.ac.uk He will gladly discuss any technical questions about the post or the working environment within his research team.