Plan Overview

A Data Management Plan created using DMPonline

Title: Collaborative Rare-earth telecom Emission Acceleration via subnanometre Near-Field Confinement

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Template: University of Manchester Generic Template

Project abstract:

High-speed telecom light sources are vital for next-generation communication, computation, and sensing in classical and quantum technologies. Rare-earth-doped materials offer deterministic and high-fidelity optical properties at telecom wavelengths (1.3–1.5 μm), ideal for those applications. However, their photon emission repetition rates are usually slow in 100s-1ks of Hz, a side-effect of the unique properties, and are insufficient for practical applications requiring a modulation speed of 100s of MHz or GHz. Conventional nanophotonic cavities integrated with rare-earth elements use the Purcell effect to enhance emission rates, but are limited to a 100-fold increase due to fundamental trade-offs that the two crucial physical parameters, high quality factor and small optical mode volume, cannot be sustained cooperatively.

This cost-share project develops a novel solution that simultaneously achieves ultra-small mode volume, targeting GHz-scale emission from rare-earth-integrated plasmonic nanofocusing structures. This project addresses the fundamental challenge by combining advanced materials and photonics expertise from the University of Manchester and advanced laser engineering expertise from South China University of Technology. The project fosters knowledge exchange through conjugated research activities, gaining new expertise and outcome dissemination, promotes the applicant’s leadership in a new interdisciplinary research field, paving the way for impactful photonic technologies to benefit the UK’s economy, and strengthens the UK’s leadership in developing universal high-speed and quantum information technologies. It will also expand academic networks across photonic and materials communities in both nations, targeting new future research visions and directions in photonic innovation, academic networks, researcher mobilities and communications through sustainable UK-China collaboration.

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Collaborative Rare-earth telecom Emission Acceleration via subnanometre Near-Field Confinement

Manchester Data Management Outline

1. Will this project be reviewed by any of the following bodies (please select all that apply)?

- Funder

2. Is The University of Manchester collaborating with other institutions on this project?

- Yes - Part of a collaboration and owning or handling data

3. What data will you use in this project (please select all that apply)?

- Acquire new data

4. Where will the data be stored and backed-up during the project lifetime?

- University of Manchester Research Data Storage Service (Isilon)

5. If you will be using Research Data Storage, how much storage will you require?

- 1 - 8 TB

6. Are you going to be receiving data from, or sharing data with an external third party?

- Yes

Data will be shared with Prof Huakang Yu, Jiale Deng, Dr Yipeng Lun, and Prof Zhiyuan Li at the School of Physics and Optoelectronics in the South China University of Technology in Guangdong, Guangzhou, P.R. China. Scientific data will be published in journals according to Royal Society's data policy that data outputs

from research supported by the Society are made publicly available in a managed and responsible manner, with as few restrictions as possible. Any technical data that might have intellectual property value will go under an agreement with participating researchers in China, the University of Manchester Innovation Centres and the Department of Business and Engagement if needed.

7. How long do you intend to keep your data for after the end of your project (in years)?

- 11 - 20 years

Guidance for questions 8 to 13

Highly restricted information defined in the Information security classification, ownership and secure information handling SOP is information that requires enhanced security as unauthorised disclosure could cause significant harm to individuals or to the University and its ambitions in respect of its purpose, vision and values. This could be: information that is subject to export controls; valuable intellectual property; security sensitive material or research in key industrial fields at particular risk of being targeted by foreign states. See more examples of highly restricted information .

If you are using 'Very Sensitive' information as defined by the Information Security Classification, Ownerships and Secure Information Handling SOP, please consult the Information Governance Office for guidance.

Personal information, also known as personal data, relates to identifiable living individuals. Personal data is classed as special category personal data if it includes any of the following types of information about an identifiable living individual: racial or ethnic origin; political opinions; religious or similar philosophical beliefs; trade union membership; genetic data; biometric data; health data; sexual life; sexual orientation.

Please note that in line with data protection law (the UK General Data Protection Regulation and Data Protection Act 2018), personal information should only be stored in an identifiable form for as long as is necessary for the project; it should be pseudonymised (partially de-identified) and/or anonymised (completely de—identified) as soon as practically possible. You must obtain the appropriate ethical approval in order to use identifiable personal data.

8. What type of information will you be processing (please select all that apply)?

- Personal information, including signed consent forms

Personal data will be shared via grant applications, progress monitoring, outputs and completion, required by the Royal Society Privacy Policy. Details can be found from Royal Society , where the terms are elaborated below:

"The Royal Society uses personal data submitted by users of our grants management and awards system, Flexi-Grant®, for the following purposes:

- Processing applications, making and administering grants and awards, monitoring, evaluation, and reporting, including statistical analysis in relation to the evaluation of research and the study of trends;
- Evaluating and assessing activities, research outputs and impact arising from grants and awards by selected third parties, such as independent evaluators, consultancy groups, and career development organisations (some of whom may be based outside of the UK and the EEA);

- In connection with any independent internal and external audit of the Royal Society;
- Processing award finances and payments to your employing host organisation;
- Contacting you about our activities and events - or to help inform or evaluate these events, our application processes, strategy and policy work - in the form of newsletters, social media, surveys, and questionnaires. Where required by law, we only send direct marketing communications by email (or other electronic means) to an individual's private address when we have their prior consent;
- Maintaining your details as part of our alumni programme once your grant comes to an end.

In assessing your application, we share details of your application with panel members and independent reviewers that are not employees of the Society. Please see the section on ‘Panel members and independent reviewers’ below for further information.

We may publish details of successful grants and awards, and their outputs, including your name, employing host organisation, project title, summary of the award, scientific abstracts, lay summaries, and the value of your award on our public website, or via publicly available databases or other publications, some of which may be accessible from outside of the UK and the EEA.

We may contact you for your consent to use information relating to you or your grant in the promotion of the Royal Society’s programmes for example in the form of case studies, blog post and other similar activities.

Any information you elect to provide during the application processes relating to gender, age, disability, ethnic origin, or nationality will be used only for the purposes of monitoring diversity and equality and stored confidentially in accordance with applicable legal obligations. Diversity data is reported on anonymously.

Personal data may be provided by third parties as part of the application process, and this data may be processed for the purposes of verifying relevant details related to grant applications.

In addition to the usage set out in the Royal Society’s privacy policy, please note that information regarding your application for International Exchanges Scheme may be shared with the National Natural Science Foundation of China (NSFC), for data monitoring and scheme evaluation purposes. You may also be contacted by selected third parties such as independent evaluators, consultancy groups, and career development organisations. If successful, the Royal Society will contact you regarding the administration of your award throughout the course of your funding and after its completion. You may also be contacted by the Royal Society and National Natural Science Foundation of China (NSFC) or an agent acting on
their behalf, for reporting and evaluation purposes throughout the course of your funding and after its completion."

9. How do you plan to store, protect and ensure confidentiality of any highly restricted data or personal data (please select all that apply)?

- Not applicable

10. If you are storing personal information (including contact details) will you need to keep it beyond the end of the project?

- Yes – Funder requirement

Information we hold about you is stored on our CRM, Microsoft Dynamics 365, which is hosted by Microsoft Corporation.

This information will be stored on the Royal Society’s systems, including its cloud-based finance system, Xledger.

11. Will the participants’ information (personal and/or sensitive) be shared with or accessed by anyone outside of the University of Manchester?

- Yes - Public institutions with contractual arrangements (e.g. NHS research sites or other higher education institutions)

See data use policy from Royal Society

12. If you will be sharing personal information outside of the University of Manchester will the individual or organisation you are sharing with be outside the EEA?

- Yes

Royal Society will obtain personal data. The policy clarifies this international scheme may share personal data with Prof Huakang Yu, Jiale Deng, Dr Yipeng Lun, and Prof Zhiyuan Li at the School of Physics and Optoelectronics in the South China University of Technology, and National Natural Science Foundation of China (NSFC), for data monitoring and scheme evaluation purposes. I may also be contacted by selected third parties such as independent evaluators, consultancy groups, and career development organisations.

13. Are you planning to use the personal information for future purposes such as research?

- No

14. Will this project use innovative technologies to collect or process data?

- No

15. Who will act as the data custodian for this study, and so be responsible for the information involved?

Huanqing Ye

16. Please provide the date on which this plan was last reviewed (dd/mm/yyyy).

2025-05-21

Project details

What is the purpose of your research project?

Study fundamental science of photonic materials.

What policies and guidelines on data management, data sharing, and data security are relevant to your research project?

The Royal Society supports science as an open enterprise and is committed to ensuring that data outputs from research supported by the Society are made publicly available in a managed and responsible manner, with as few restrictions as possible. Data outputs should be deposited in an appropriate, recognised, publicly available repository, so that others can verify and build upon the data, which is of public interest. To fully realise the benefits of publicly available data they should be made intelligently open by fulfilling the requirements of being discoverable, accessible, intelligible, assessable and reusable.

The Royal Society does not dictate a set format for data management and sharing plans. Where they are required, applicants should structure their plan in a manner most appropriate to the proposed research. The information submitted in plans should focus specifically on how the data outputs will be managed and shared, detailing the repositories where data will be deposited.

Responsibilities and Resources

Who will be responsible for data management?

Huanqing Ye

What resources will you require to deliver your plan?

access University's Research Data Storage

Data Collection

What data will you collect or create?

1. Txt format data: They contain numbers and texts related to experimental data. The total volumes will be a maximumly of 10 Gbs.
2. Tiff graph data: They are extracted from microscopy tools as experimental data. The total

volumes will be a maximumly of 10 Gbs.
3. Experimental samples, software coding and mechanical designing models.
4. They will be new data and can be shared via publications, conference presentations and requests from Huanqing Ye, who will assess to share under the University's and Royal Society's data policy.

How will the data be collected or created?

Data will be collected by reproducible experiments with repeat samples, experiments and data analyses, by using the University's authorised computers, software, operating platforms and equipment. They can only be accessed by authorised users. The data will be stored in a folder hierarchy with all the data files named by dates, sample versions, experimental conditions, measurement iterations, etc.

Data will be stored in the University's Research Data Storage

Documentation and Metadata

What documentation and metadata will accompany the data?

Experimental methods and analysing processes will accompany those data by using documents including Orginal Labs' Obj. format file, words, powerpoints, python's codes (.py format), etc.

They will also be stored in a folder hierarchy with all the data files named by dates, sample versions, experimental conditions, measurement iterations, etc.

They will be stored, accompanying original data, in the University's Research Data Storage

Ethics and Legal Compliance

How will you manage any ethical issues?

There are no ethical issues in this project

How will you manage copyright and Intellectual Property Rights (IPR) issues?

Publishing data will obey the copyright and IPR policies of publishing journals.

Storage and backup

How will the data be stored and backed up?

The data will be backed up regularly, like once-a-day and will be backed up to Research Data Storage.

How will you manage access and security?

1. All the data will be collected, processed, stored and backed up on University's authorised computers and equipment, which are located in the Photon Science Institute.
2. Sharing with collaborators will be through University's authorised sharing methods like Figshare.

Selection and Preservation

Which data should be retained, shared, and/or preserved?

There are particular data that need be preserved and archived.

What is the long-term preservation plan for the dataset?

No relevant

Data Sharing

How will you share the data?

Data will be shared using a secure data service, i.e. Figshare.
Sharing can only be through Huanqing Ye and be published by Royal Society according to the data policy for awarded funding owners.
Any others, including the project's collaborators, will request data from Huanqing Ye, along with consent for publication in journals and the Royal Society for re-use.

Are any restrictions on data sharing required?