National Physical Laboratory
Hampton Road
Teddington
Middlesex
United Kingdom
TW11 0LW

Switchboard 020 8977 3222
www.npl.co.uk/contact

Research Integrity Annual Statement
1st January 2022 – 31st December 2022

1. Introduction

Research Integrity is a bedrock for trust in NPL, our impartiality, probity and the rigorous accuracy and reproducibility of our research. Everyone at NPL is required to act with integrity and comply with our code of conduct and our ethics policy. We are committed to the principles of the concordat to support research integrity:

1. upholding the highest standards of rigour and integrity in all aspects of research
2. ensuring that research is conducted according to appropriate ethical, legal and professional frameworks, obligations and standards
3. supporting a research environment that is underpinned by a culture of integrity and based on good governance, best practice, and support for the development of researchers
4. using transparent, timely, robust and fair processes to deal with allegations of research misconduct, should they arise
5. working together to strengthen the integrity of research and to review progress regularly and openly

As the UK's National Metrology Institute, NPL is keen to support GO Science to implement the Concordat to Support Research Integrity within Government.

This statement is publicly made to fulfil the recommendations made by the Concordat for annual reporting on research integrity and covers the period 1st January 2022 to 31st December 2022. The activities detailed are being undertaken to broaden understanding of research integrity and embed good practice across the organisation. This document is designed to be stand alone, with new developments for the year highlighted in each section, with developments made in previous years that have continued also discussed.

Web address of institutional research integrity page: https://www.npl.co.uk/corporate-information/research-integrity-governance
Named contact points for: • **Questions/ information on research integrity:** ○ Chief Scientist, **Professor JT Janssen** ○ Head of Metrology, **Professor Richard Brown** ○ Director of the Post Graduate Institute, **Professor Richard Burguete** • **Concerns about research integrity/ research misconduct:** ○ Please email: **integrity@npl.co.uk** (Confidential) or **ethics@npl.co.uk**
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2. 2022 Key achievements supporting and strengthening research integrity

2.1. Policies, processes, systems and guidance

NPL continue to improve our systems and processes to deliver best practice and meet the expectations of the concordat.
In 2022 NPL created a new directorate, Environment, Social and Governance, bringing together Legal, Marketing, Quality Assurance, Health, Safety, Environment and Security and Commercial Excellence teams. This combined with a transition to a new SharePoint internal intranet enables greater accessibility and searchability for staff to be able to find relevant documents, processes, and policies. There is also much clearer guidance on who to contact with relevant issues, and ownership of documents and pages to ensure information is kept up to date.

The Knowledge Management System (KMS) for publications is now embedded within NPL processes, with over 1600 articles for publication and NPL reports entered into the KMS system. Improvements are ongoing, for example to support change of responsible author in case of staff leaving the organisation. In 2021 Data Management Plans and a central hub for storing them went live. Following this, in 2022 work began into a knowledge management strategy which aims to understand how knowledge flows through the organisation and improve accessibility of knowledge.

NPL has published its Diversity and Inclusion Strategy 2022-2027 and updated its webpage (https://www.npl.co.uk/about-us/diversity-and-inclusion). The strategy aims to create a culture where all employees feel their differences are valued and they are empowered to bring their genuine selves to work, and all employees have access to support when they need it and believe that NPL is an inclusive place to work for all. Through an inclusive environment where everyone feels comfortable participating, we can enhance our creativity and ability to innovate. A number of actions have already been undertaken including (but not limited to) updating policies and staff code of conduct, raising awareness through an intranet hub with blogs and news stories and making changes to the recruitment processes to expand diversity in applications. Along with this, NPL successfully renewed its Juno Practitioner status in April 2022.

We have updated Doctoral Research Supervision Charter (2022) within our PostGraduate Research Institute (PGI), to now included a section on research integrity. This includes:

- Emphasising the importance of supervisors being mindful of values such as rigour, transparency etc in every aspect of PhD lifecycle
- Why research integrity is important to both student, supervisor and NPL
- Resources for supervisors to signpost students towards such as NPL's webpage on research integrity and the concordat

In 2022 the Ethics Committee received and considered 2 project proposals that flagged one or more ethical issues in accordance with our ethics policy that needed approval to continue from the NPL ethics committee. Of these 2 proposals, 1 project involved animal tissue and use of human material, and 1 involve human participants as test subjects. Approval was granted for each project.

2.2. Training and awareness

Ian Gilmore gave a talk to the postgraduate institute at NPL on Research Integrity, with a good discussion with those who attended.

In September 2022, NPL published NPL's metrology research roadmaps. These set out some of societies greatest metrology challenges. We highlighted the importance of Research Integrity and Research Culture to NPL and emphasised our commitment to the UK Concordat on Research Integrity (page 10). We have shared the roadmaps with our partner organisations, and international colleagues where they have stimulated international discussion, and inspired other organisations to begin creating their own version. We hope this will inspire scientists to join us in creating collective solutions to overcome metrology barriers and improve reproducibility in research.

The Quantum Electrical Metrology (QEM) group introduced a blind measurement protocol into the group's precision measurements in early 2021. This was in response to a growing recognition of the role of experimenter bias in the wider scientific community, and the particular problems of bias in precision metrology measurements where there is strong expectation that the result will fall within certain limits. Under the blind protocol, the lead experimenter cannot see the true result of the experiment while the measurements are underway, but only a scaled representation of the data. Thus, they cannot make deliberate or unconscious adjustments to bring the result closer to the expected value. One member of the team who is not directly involved in the experiments holds the software "key" to unlocking the true experimental result. This is only done after the measurements have been completed. In 2022, the blind protocol experimentation and results were written up and submitted as a paper to *Metrologia* (currently under review). The work was also presented at the conference on precision electromagnetic measurements (CPEM 2022) in New Zealand in December 2022. There is growing awareness of the need for blind measurements in precision metrology experiments and many labs are either using them already or planning to use them. Future experiments with the electron pump research will implement the blind protocol again to guard against bias.

2.3. External engagement

- NPL is a member of the UK Research Integrity Office (UKRIO)
- We actively participate in the UK reproducibility network
- Ian Gilmore is a member of UK Committee on Research Integrity (UK CORI)
- Jennifer Clarke attended the UKRI Research and Innovation Culture Roundtable (Dec 22) where discussions were held on how to share best practice across academia, industry and government and what systematic change might be needed.

3. Research Misconduct

NPL provides assurance that the processes in place for dealing with allegations of misconduct are transparent, robust and fair and that they are appropriate to the needs of the organisation**.** Research Misconduct is defined in our code of conduct. NPL also has a whistle blowing policy. Investigations are conducted according to our disciplinary procedure.

To enable a research environment where all staff, researchers and students feel comfortable to report instances of misconduct, there are a number of routes that can be followed. Allegations can be made to our science leadership team escalating from Science Area Leaders (33 groups), or Department Heads of Science (9 departments) to the Office of the Chief Scientist or they can be made directly to the Office of the Chief Scientist (see our Research Integrity webpages for contact details).

3.1. The NPL Statement on any formal investigations of research misconduct that have been undertaken.

A summary is provided in Table 1 showing the number of formal investigations completed in this period and of those, the number which were upheld (either in whole or in part). NPL had no formal cases of research misconduct in 2022.

NPL confirms that we have fulfilled any requirements to make reports to external bodies, including regulatory and professional bodies, regarding the initiation or completion of a formal investigation.

Professor JT Janssen
Chief Scientist
National Physical Laboratory (NPL)

Table 1 Research Integrity Statement – 1st January 2022 to 31st December 2022

	Number of allegations for which an investigation has been undertaken	Number of allegations upheld (in whole or in part)
Fabrication	0	0
Falsification	0	0
Plagiarism	0	0
Misrepresentation	0	0
Breach of Ethics	0	0
Breach of Duty of Care	0	0
Authorship disputes	0	0
Other e.g., unprofessional behaviour relating to research misconduct	0	0