DIRAC AND NHS INNOVATION PLACEMENT: IMPROVING HEALTH OUTCOMES FOR CHILDREN AND YOUNG PEOPLE USING DATA SCIENCE AND AI

INFORMATION PACK

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NHS

DiRAC
High Performance
Computing Facility

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In collaboration with the Evelina Children's Hospital and the KCL Department of Women and Young People's Health, DiRAC is pleased to invite applications for a 6-month Innovation Placement focusing on improving health outcomes for children and young people using data science and AI.

Background to Organisation

Evelina Children's Hospital and the KCL Department of Women and Young People's Health, Guy's and St Thomas' NHS Foundation Trust

Research Context

Professor Ingrid Wolfe and her colleagues at the Evelina Children's Hospital and the KCL Department of Women and Young People's Health are building on their world-leading healthcare data research. This research contains some of the most complete and comprehensive longitudinal patient data in the world, in particular its collection of physical health and symptom status, mental health and wellbeing, and socio-economic data which complements the healthcare data.

Academic Expertise & Industry Experience

As a student or early-career researcher, you will gain experience by being embedded in Professor Wolfe's team, which includes clinical and healthcare professionals as well as experts in IT and Data Science. Professor Jeremy Yates and Dr. Maria Marcha from DiRAC will also provide supervision on various aspects of data science and machine learning.

The project will be managed through weekly meetings with supervisors and larger monthly group meetings. A day-to-day supervisor will also be assigned. This support is essential in a busy NHS research environment.

Impactful Development

The project will involve organising healthcare data to develop or train Analytical/AI/ML-based models for individuals, families, and communities. You will build a tool that conveys important information to clinicians and healthcare providers. To do this, you will work closely with clinicians who write the notes, order tests, and prescribe treatments to construct the necessary databases. This work will help you understand what constitutes an alert, what feedback is required, and how it should be delivered. This is vital for developing a tool that clinicians will trust.

Participation in System Change

The contribution will be a proof-of-concept tool that ingests selected data from primary (GP) and secondary (hospital) healthcare databases, as well as patient-entered data (e.g., symptom control). This tool will automatically update at the individual level as new data is entered. It will adjust for any changes to population health that the data reveals. If a change raises concern, an alert will be sent to the relevant clinician or healthcare manager.

Placement Details

Location: London
Proposed start: January 2025

Typical areas of improvement could be for direct patient care and population health management, with the aim of improving outcomes, reducing inequalities, and enhancing the efficiency of health system function.

Asthma Outcomes:

Can we predict, based on age, postcode, deprivation indices, prescription patterns, and healthcare use patterns, which children are at risk of worsening asthma control? This would inform targeted early intervention for children.

Mapping Unmet Needs:

Can we map patterns of known unmet needs at a population level and use these data to model unknown unmet needs? This would inform population health management at scale and help direct intensive early intervention services within the community.

Predicting Service Demand:

Can we use data on known unmet needs to predict trends and patterns in demand, clinical capacity required for early intervention at scale, and impacts on services? This would help inform service planning, reduce inequalities in outcomes, and enable early intervention to ultimately reduce acute demand.

Responsibilities

The candidate is expected to be an active member of the team, engaging in the use of advanced methods to assess how patterns in the use of medicines evolve over time for patients, focusing on common and rare medicines.

With support from the team, the candidate will be expected to produce work of sufficient quality that it will be suitable for publication in peer-reviewed journals. This will also form the basis of the report submitted at the end of the placement.

Final Digital Asset

An alert tool to improve individual and population health. This project will involve using the aforementioned data to develop a proof-of-concept tool that can be considered for the Learning Health System. These data consist of detailed numerical data and non-numerical data such as clinicians' notes, health data codes, and other forms of data such as socio-economic and mental health data.

The output will be a tool that can send alerts to the relevant clinicians. Clinicians will then assess the efficacy of the tool and its alerts, and you will work with them to improve the efficacy of the tool.

Applicant Profile, Skills & Experience

We are looking for individuals with:

> Strong understanding of data structures and data modeling

Experience in data science and machine learning

> Advanced coding skills (Python and other languages) and application of these to real-world problems
> Advanced statistical skills and experience with relevant packages (e.g., R)

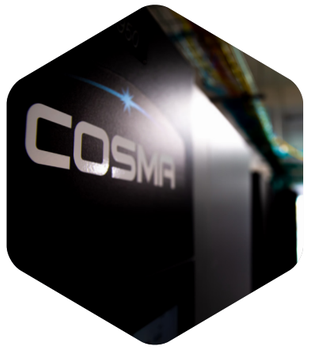
Equality, Inclusion & Diversity

The NHS welcomes applications from all. All applicants will receive consideration without regard to race, national origin, gender, age, religion, disability, or any other category protected by law.

DiRAC HPC

About DiRAC

Established in 2009, DiRAC provides high performance computing (HPC) services to the UK's Scientific Research Communities in theoretical cosmology, nuclear physics, astrophysics, particle physics, and solar and planetary science. DiRAC is funded by the Science and Technology Facilities Council (STFC), part of UK Research and Innovation (UKRI). To date, capital funding for DiRAC systems has been provided by the Department for Business Innovation and Skills (BIS), the Department for Business, Energy and Industrial Strategy (BEIS), STFC and UKRI. UKRI is now part of the Department of Science Innovation and Technology (DSIT). DiRAC operations are funded by STFC.



We host three HPC services: the Extreme Scaling Service, the Memory Intensive Service, and the Data Intensive Service, with each tailored to the specific types of computational workflows needed to deliver our Science Programme. Innovation is a key part of DiRAC's activities and all our services are co-designed in collaboration with our research community, our technical and software engineering teams, and our vendor partners.

62% of employers deem relevant work experience of significant or critical importance when searching for new recruits (UK Department for Education, Employer Skills Survey 2022)

Innovation Placements

DiRAC Innovation Placements provide a superb opportunity for doctoral students and early career researchers to collaborate with industry leaders on cutting-edge research projects of mutual benefit. Projects take place over six months and address current challenges with innovative, state-of-the-art solutions, ensuring that the research is relevant and impactful for both parties.

Innovation Placements offer a unique opportunity for researchers to bridge the gap between academia and industry, contribute to impactful research, and gain practical experience in the commercial sector.

Benefits to student/ECR

- **Practical Experience:** A placement allows you to apply theoretical knowledge in a real-world setting, enhancing your understanding of how your research can impact industry.
- **Skill Development:** You can develop valuable skills critical to your professional development, such as project management, teamwork, and communication in a corporate environment.
- **Enhance your Research:** Exposure to industry challenges can inspire new thinking, reasoning, and innovative approaches to your research, potentially leading to impactful findings.

Benefits to Career

- **Improved Employability:** Experience in an industrial setting will enhance your CV, making you more attractive to employers in both academic and non-academic fields.
- **Confidence Building:** Navigating a professional environment will build your confidence in your abilities and prepare you for future workplace challenges.
- **Career Exploration:** It provides insight into different career paths outside academia, helping you make informed decisions about your future.
- **Networking Opportunities:** Placements facilitate connections with industry professionals, which can lead to collaborations, mentorship, and future job opportunities.

How to apply

Download and complete the application form, which is available on our website, dirac.ac.uk/innovation-placements, or by following the QR code below, and return to us via email at:

DiRAC_placements@leicester.ac.uk

Deadline for applications is 23:59 on 20th November 2024

Placement Stipulations

Placements are open to PhD students and early career researchers, and are fully funded but you must get your supervisor or PI's permission before applying – under UKRI rules participation in the scheme is only allowed with their consent.

The successful candidate will remain based at their home university. We do our best to offer flexibility; part-time working can be arranged as long as the placement does not exceed 1 year.

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