

**Collaborative Doctoral Awards
Studentship Competition (Project-led)**



Arts & Humanities
Research Council

Part 1 : Project Proposal Application

To be completed by the lead proposed supervisor(s) and non-HE partner organisation.

**Before completing each section, please consult the Guidance Notes.
Failure to provide the required information may result in disqualification.**

SECTION 1: PROJECT PROPOSAL AND CASE FOR SUPPORT			
Proposed Project Title:	Placing Astronomy: Landscape, Space and Science at Armagh Observatory, 1790-1916		
Project Summary: <i>(Maximum 100 words)</i>	The project aims to investigate the historical geographies of astronomy at Armagh Observatory, which is the oldest continuously-active astronomical research institution in the British Isles. The importance of place and landscape to the science conducted at the Observatory is evidenced by its position in the wider regional landscape, the situation of several historic astronomical instruments, and its ecclesiastical and civic connections to the City of Armagh. The student, based partly at the Observatory and partly at QUB Geography Department, will be in a unique position to re-appraise the Observatory's scientific heritage at an important time in its contemporary development.		
Name of non-HE Partner Organisation:	Armagh Observatory and Planetarium		
Name of Contact at non-HE Partner Organisation:	Professor Michael Burton	Email Address:	Michael.Burton@armagh.ac.uk
Primary AHRC Subject Area:	Cultural and Museum Studies: Cultural Geography		
Secondary AHRC Subject Area (if Interdisciplinary):	Choose an item.		
Does the project Include a creative practice component?	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>		
If you have listed two subject areas above, do you consider the project to be interdisciplinary?	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> N/A <input type="checkbox"/>		
If Yes, please briefly state why: <i>(Maximum 100 words):</i>			
N/A			
Please provide full details of the proposal and make your case for support below: <i>(Maximum 750 words)</i>			
<p><u>Aim of the Project</u> This collaboration presents an exceptional opportunity for a doctoral student to investigate the historical geographies of astronomy at Armagh Observatory, the oldest continuously-active astronomical research institution in the British Isles. The Observatory is home to a scientific heritage that has been intimately connected to a sense of place and landscape, yet one that has been largely overlooked in terms of its historical and geographical significance. This project will address these issues by placing the student at the heart of the Observatory to study its past spaces of science.</p> <p><u>Institutional Context</u> Founded by Archbishop Richard Robinson in 1790, at the height of the Age of Enlightenment, Armagh Observatory is housed in a Grade A-listed heritage building, and is surrounded by 11 hectares of landscaped parkland. The significance of place and landscape to Armagh Observatory's scientific heritage is evidenced by the precise context of its location, with line-of-sight connections to three historic meridian markers on the outskirts of Armagh, its strong civic and ecclesiastical connections to the City of Armagh, and its dual historical use as a domestic home for astronomers as well as a place of scientific research. The Observatory houses several unique instruments</p>			

that remain in the places in which they were used to conduct pioneering astronomical measurements, such as the Troughton Equatorial Telescope, which is the oldest telescope in the world that remains in its original setting, the Grubb 15-inch Equatorial Reflector Telescope, which was the first of its kind, and the Earnshaw Transit Clock, which was believed to be the most accurate clock in the world in its day. The study encompasses the careers of the first four Directors of the Observatory, who along with their colleagues pioneered modern scientific understandings of the Universe, most significantly in the publication of globally-authoritative catalogues of stars and nebulae in 1859, 1888, 1895 and 1908. The Observatory is now part of Armagh Observatory and Planetarium (AOP), one of Northern Ireland's leading research, educational and heritage institutions. AOP is currently preparing plans to secure its cultural and scientific heritage, which include designs for a new archive building and landscaping works, alongside plans to have Armagh designated as a 'Dark Sky City'.

Research Context and Objectives

Aside from a brief institutional history (Bailey, 2011), the legacy of Armagh Observatory as a scientific space remains poorly-documented in arts and humanities research. Geographical approaches to the history of science have been pioneered by scholars interested in the ways in which scientific practise has been contingent on spaces such as laboratories, museums and botanical gardens (Livingstone 2003, Naylor 2005, Johnson 2011). Armagh Observatory's setting as part of an ancient cosmic landscape, in the ecclesiastical capital of Ireland, and at the nexus of a modern landscape of scientific observation and interpretation, presents particular opportunities for broadening this field of enquiry, taking into account new scholarly directions in cultural and historical geographies of landscape, histories of observatory science, and cosmography (Edensor and Lorimer 2015, Aubin 2015, Dunnett *et al* 2017). Key research questions will include:

- How were new scientific concepts about the Earth and the Universe theorised, tested and negotiated in the spaces of Armagh Observatory?
- How have the historic landscapes of the Armagh region influenced the development of scientific activity at the Observatory?
- Who were the key actors in the making of this space, and what networks did they establish with a wider community of astronomical research?
- What has been the relationship between religious space and scientific space at Armagh Observatory?
- What has been the significance of site-specific instrumentation to the conduct of astronomy at Armagh Observatory?

Research Methods and Sources

A combination of archival research, interpretation of historic instruments and landscapes, and analysis of written and visual sources will be central to understanding Armagh Observatory's historic development. AOP owns a substantial record of original archival material dating back to the eighteenth century, including correspondence, buildings records and specifications for scientific instruments. These will be examined to interpret the Observatory's scientific and spatial histories, including the development of key buildings and the landscapes to which they were connected. Analysis of historic telescopes, globes, clocks and other instruments in situ will be essential to understanding past interactions between scientific practice, place and landscape. Supplementary material, including landscape paintings, historic maps of the region, and local newspaper reports, are held at AOP, the Public Record Office of Northern Ireland (Belfast), and QUB Geography Department (Belfast), and will be the basis for further analysis in support of the core research questions.

Please provide details of any resources and facilities, including details of any high cost equipment, fieldwork, training, etc., that may be required to complete the project successfully, and where you will seek these resources (e.g. NBCDTP; partner resources; departmental/school funds). Please include estimated costs:

(Maximum 200 words)

The principal resources and facilities required to complete the project relate to accessing the extensive scientific archives, buildings, instruments and associated artefacts held by Armagh Observatory. These will be made fully available to the student, and there is no specific cost related to accessing these resources and facilities, or any specific training required outside of the usual expectations for doctoral study. Travel costs between Armagh and Belfast, a journey of 40 miles, would be sought from the funder (the estimated cost of 6 return trips per year x 3.5 years is £875). Expenses to cover annual attendance at national and/or international conferences would also be sought from the funder (approx. £1,500).

Please outline the arrangements for communication between the partner organisation and academic host organisation in regard of the project management and the monitoring of academic progress:

(Maximum 150 words)

The communication arrangements between the student, the partner organisation and the academic host organisation will be through regular email, video-conferencing, telephone and personal meetings. Meetings will be arranged on a regular basis (at least six per calendar year), held either at Armagh Observatory or at QUB Geography Department. Alternating the location of supervision meetings between the two institutions might be one way of doing this. Project management will be the primary responsibility of the student. Academic progress will be monitored principally by the lead supervisor (QUB), with input from the second (AOP) and third (QUB) supervisors, through regular supervision meetings, review of draft work, and completion of paperwork in accordance with QUB's doctoral monitoring procedures. A formal process of Initial Review (after three months), Differentiation (after one year) and subsequent Annual Progress Reviews will also be completed as part of such procedures.

What benefits will accrue to the student and the partner organisation as a result of your collaboration?

(Maximum 300 words)

The student will benefit from a unique collaboration between two historic institutions in Northern Ireland. They will gain unprecedented access to the archival and material holdings of Armagh Observatory, and the opportunity to study these records and artefacts at the heart of the Observatory itself. In doing this the student will gain substantial experience in historical arts and humanities research, including archival analysis, interpretation of objects and buildings, and visual analysis of artwork and plans. The student will benefit from being able to work across two distinct but complementary research environments, including meaningful contact with a wide range of researchers, community stakeholders and partner institutions. The student will further benefit from administrative support, workspace and library access at both institutions, as well as access to research seminar series and other scholarly activities in both geography and astronomy.

Armagh Observatory and Planetarium is undergoing a process of transformation since the Observatory and Planetarium were merged into a single organisation in 2016, allowing the benefits from synergies between research, education and outreach to be realised. The proposed collaborative doctoral project greatly contributes to developing this process, as it will help AOP in understanding its own history, and its context within the City of Armagh and the landscape in which it is situated. As such, the benefits to the partner organisation are considerable, and can be measured through a number of 'pathways to impact': helping AOP to define its future objectives and developments; providing focus and evidence in contribution to funding bids currently underway (such as to the National Lottery Heritage Fund); and in augmenting current outreach activities (such as educational tours of the Observatory) through the sharing of novel research findings, thereby opening up the rich scientific heritage of the Observatory.

Please briefly state what financial (if any) or in-kind contribution the partner will be making over the duration of the award:

(Maximum 100 words)

Armagh Observatory and Planetarium will primarily be contributing supervisory support and a designated workspace within the Observatory itself, amounting to a substantial in-kind commitment to the project. This will include access to the same ICT and administration support enjoyed by AOP staff and PhD students.

Please describe the nature of the collaborative arrangement and the activities the student will be taking with the organisation:

(Maximum 300 words)

This application has emerged following a teaching collaboration that has been ongoing between the two organisations for a number of years. The first supervisor (Dr. Dunnett), in 2015 and in 2019, organised a field trip to Armagh Observatory and Planetarium for a third year optional module, Geographies of Outer Space, with a total of 60 undergraduate students, supported by the Observatory Director (Prof. Burton and his predecessor Prof. Mark Bailey) as part of AOP's educational outreach programme. A number of meetings and phone calls have taken place between Dr. Dunnett and Prof. Burton since February 2019 to discuss the potential for doctoral funding. The nature of the doctoral collaboration lies in the close co-supervision of the project, and in the manner in which the student will conduct their research. The project will be supported by substantive and sustained co-supervision, through which geographical perspectives on place and landscape, supported by in-depth knowledge of astronomy and instrumentation, will be brought together in a supportive intellectual environment. From a practical perspective, the student will have access to workspace in both QUB Geography Department and at Armagh Observatory, and will be expected to spend roughly equal amounts of time at each institution, depending on the stage of research (e.g. archival study, writing up). Regular supervision meetings will be held variously between AOP and QUB Geography Department. In terms of the activities the student will be undertaking with Armagh Observatory, this will include an initial guided tour of the Observatory, including the historic buildings and instruments, and the surrounding landscape features. Analysis of the buildings, in situ instruments and archival materials will form the bulk of the activity conducted at AOP, supported by access to workspace within the historic Observatory buildings themselves, among active astronomy researchers.

SECTION 2: SUPERVISION AND EXTERNAL ADVISORS

First Supervisor:	Dr. Oliver Dunnett	School/Department:	Department of Geography, Queen's University Belfast
Second Supervisor:	Prof. Michael Burton	School/Department:	Armagh Observatory and Planetarium

Additional Advisor:	Prof. Nuala Johnson	Organisation/Institution:	Department of Geography, Queen's University Belfast
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Explain how the expertise of the supervisory team and external advisors will allow them to support the proposed project and the selected student:

(Maximum 500 words)

The first supervisor, Dr. Oliver Dunnett, is a cultural and historical geographer and Lecturer in Human Geography at Queen's University Belfast. He has published articles relevant to the project in leading geography journals, including on geographies of outer space (*Progress in Human Geography*, 2019) and astronomical landscapes in Britain (*cultural geographies*, 2015), while a book on twentieth-century British cultures of outer space is forthcoming (Routledge, 2020). He has taught at undergraduate and postgraduate levels on topics including cultural geographies of landscape, historical geographies of science, and geographies of popular culture. He has supervised two doctoral students to completion, on 'Geographies of Astronomical Expeditions in the Early Twentieth Century' (R. Mawhinney, 2019) and 'Modernization, Genealogy and Landscape Change in South Korea' (W. Song, 2017), as well as two masters-level dissertations and over thirty undergraduate dissertations, and is to attend the Northern Bridge Supervisory Training Event in Belfast in November 2019. His expertise in landscape, place and the historical geography of space science will be central to the supervision of the selected research student.

The second supervisor, Professor Michael Burton, is the Director of Armagh Observatory and Planetarium and one of the world's leading researchers in astronomy, specialising in studying how stars are formed in the interstellar medium. He has contributed to over two hundred refereed scientific journal articles, including in *Nature* (1993), and the leading astronomical journals *Monthly Notices of the Royal Astronomical Society*, *Astrophysical Journal* and *Astronomy & Astrophysics*. He was previously Director of Teaching at the School of Physics, University of New South Wales, and is the President of the largest Division (Facilities, Technology, Data Science) of the International Astronomical Union. He has supervised seventeen PhD students. His career has involved periods at several other historic observatories (including the Royal Greenwich Observatory and Royal Observatory Edinburgh), in addition to modern observatories in Australia, Hawaii, Chile and with NASA. His knowledge of the astronomical techniques and related scientific processes that were carried out at Armagh Observatory, and oversight of the Armagh Observatory and Planetarium complex, will be an essential part of the supervision process. His PhD thesis was based on an interstellar object called 'IC443' that was recorded in the 1895 Catalogue at Armagh Observatory.

The third supervisor, Professor Nuala Johnson, is a historical and political geographer and Professor of Geography at Queen's University Belfast. Her recent publications have focused on topics including natural history expeditions in early-twentieth-century Burma (*Transactions IBG*, 2017), Irish artists' depictions of the First World War (Routledge, 2016), and representations of maritime heritage in Belfast's Titanic Quarter (*Historical Geography*, 2014). She has published books including *Nature Displaced*, *Nature Displayed: Order and Beauty in Botanical Gardens* (IB Tauris, 2004) and *Ireland, the Great War and the Geography of Remembrance* (Cambridge University Press, 2003). She has supervised six doctoral students to completion in the areas of historical, cultural and political geographies, and her expertise in historical geographies of science and landscape in Britain and Ireland will be important in supporting the selected research student.

SECTION 3: RESEARCH ENVIRONMENT

Please provide details about the research environment the selected student will be joining and its suitability:

(Maximum 500 words)

Queen's University Belfast has an internationally-recognised profile for research in historical geography, and in particular historical geographies of science. This has been evidenced through the work of Professor David Livingstone CBE on the spatiality of scientific culture and intellectual history, Professor Nuala Johnson on the historical geographies of botanical science, memorialisation and landscape, Professor Keith Lilley on historic maps, landscapes and built environments, Dr. Diarmid Finnegan on the historical geographies of the life and earth sciences, and Dr. Oliver Dunnett on historical and cultural geographies of outer space, including astronomy and space science. As well as joining this group of scholars in historical geography, the student will become part of the School of Natural and Built Environment's 'Culture and Society' Research Cluster, which includes researchers from human geography, planning, archaeology and architecture, and organises research activities throughout the academic year.

Armagh Observatory is an active research institution, with researchers undertaking work across a variety of astronomical themes. Research fields include the Sun (Prof. G. Doyle), Solar System bodies (Dr. A. Christou & S. Bagnulo), stellar evolution (Prof. S. Jeffery, Drs J. Vinke & G. Ramsay), star formation (Prof. M. Burton) and galaxy evolution (Dr. M. Sarzi). Doctoral students come under the supervision of QUB academics and AOP researchers, accredited mostly by QUB, as well as by other universities in England and the Republic of Ireland. Armagh Planetarium receives c.50,000 visitors per year and conducts education programmes to c.30,000 children at

pre-school, primary and secondary levels. The Education and Research teams work together on many outreach activities to the public, ensuring that these are informed by scientific knowledge and the results of current research. Particularly notable is that Armagh Observatory's historic telescopes remain in situ within an organisation still actively carrying out research, so that the stories of scientific discovery can still be seen in the place where they were carried out, and where discovery still continues today.

In terms of the wider postgraduate and scholarly community, the selected student will join a group of (at present) twenty-one doctoral research students working across physical, human and environmental geography at QUB, and ten doctoral research students in astronomy at Armagh Observatory. The student will also become a member of the QUB Graduate School, which offers a world-class intellectual and social hub that connects students from all disciplines to one another, and to mentors, leaders, and employers within the university and beyond. Additional scholarly activities in which the student will be expected to participate include a year-long Geography seminar series, and the Astrophysics Research Centre's seminar series, both of which attract a wide range of home and visiting scholars to showcase their work. The student will also be encouraged to participate in wider regional and national research communities, such as the AHRC Northern Bridge DTP Consortium, the Irish Network for Nineteenth-Century Studies, and the Historical Geography Research Group of the RGS-IBG.

08 October 2019

Statement of Support for AHRC CDA Application

I am writing a letter of support for this application entitled 'Placing Astronomy: Landscape, Space and Science at Armagh Observatory, 1790-1916'.

The Armagh Observatory was founded in 1790 by Archbishop Richard Robinson and is the oldest Observatory continuously used for astronomical research in the UK; it contains a rich scientific heritage with its original telescopes still remaining *in situ* within the Observatory building, while modern day research continues around them. The Armagh Planetarium was created in 1968, providing an education and outreach arm, and a major visitor attraction in Northern Ireland.

We strongly support this proposal, which closely ties in with AOP's own objectives to better tell the story of the Observatory to the public, its important role in the development of astronomy since the Renaissance, and its place within the wider landscape and heritage of Armagh.

We would provide supervisory support and office space in AOP for the student, with access to the same ICT and administration support enjoyed by AOP staff and our PhD students. We would provide access to our extensive scientific archives, instruments and associated artefacts needed for research. We would provide the opportunity to interact with the staff and students of AOP in pursuing this project, as well as with the wider community and stakeholders that AOP deals with.

With regards,

Yours sincerely



Professor Michael G. Burton
Director, Armagh Observatory and Planetarium
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