Written evidence submitted by Dr James Poskett (AST0005)

Enhancing Diversity in UK Astronomy from a Historical Perspective

Evidence Submitted to the 'UK Astronomy' Parliamentary Committee Inquiry

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Key Findings

- Historical contributions from minority ethnic researchers to UK astronomy are rarely properly highlighted in education or the media.
- Historical contributions from women to UK astronomy are rarely properly highlighted in education or the media.
- The UK does not make full use of the history of science and associated astronomical heritage in promoting public interest in astronomy and trust in science.

Key Recommendations

- Teach a diverse history of astronomy as part of the core national school curriculum, particularly in GCSE and A-Level Physics.
- Update national curriculum guidance to explicitly require an understanding of the diversity of contributions to UK astronomy.
- Work with the science heritage sector to promote these narratives in the public sphere and media.
- Work with professional astronomy societies to promote these narratives amongst scientists and the public.

Introduction

Astronomy has the potential to play a significant role in encouraging greater diversity and inclusion in science, technology, engineering, and mathematics (STEM) in the UK. More broadly, astronomy has the potential to enhance public interest and trust in science in the UK. However, as it stands, the UK does not make the most of the history of astronomy and associated heritage in pursuit of these goals. In this submission, I suggest some of the ways in which a better public understanding of the history of astronomy could enhance UK astronomy now and in the future. This submission is divided into three core sections. In the first section, I highlight the contributions of minority ethnic and women researchers to the development of astronomy in the UK. In the second section, I discuss the ways in which these contributions could be better highlighted in education and the media. I then conclude with a series of recommendations, which are summarised at the top of this document, alongside existing examples of best practice. At the broadest level, this submission makes the case for the importance of history in understanding and enhancing UK astronomy, particularly when it comes to diversity.

Diversity in the History of UK Astronomy

The history of astronomy is typically presented as a history of the contributions of white European men. This is especially the case in the UK, where a typical list of important British astronomers would include Isaac Newton (1643–1727), William Herschel (1738–1822), and Fred Hoyle (1915–2001). This lack of diversity is reinforced in the media, where astronomy is often associated with individual television or radio presenters such as Patrick Moore (1923–2012) and Brian Cox (1968–). Of course, it is certainly true that all these individuals

have played an important role in the development of astronomy in the UK. There are also important examples of individuals who have broken this mould, particularly the incredible work of Maggie Aderin-Pocock (1968–). However, the overall picture of astronomy presented in both our education system and media lacks diversity. This is part of a broader issue with the way in which science is presented to the public, something I addressed in a previous evidence submission for the 'Diversity in STEM' inquiry (DIV0073).

The history of astronomy in the UK is particularly well suited to highlight the diversity of people and cultures who play a role in the development of science. There are many significant figures from minority ethnic backgrounds in the history of astronomy who either studied or worked in the UK. The same is true of the many women who played a significant but often under-recognised role in the development of UK astronomy. A few examples will suffice to illustrate this point.

Francis Williams (c.1690–c.1770)

Francis Williams, whose portrait is held in the Victoria & Albert Museum, was a Black Jamaican astronomer and mathematician, born at the end of the seventeenth century. During a period of the growth in the slave trade and the slave plantation system, Williams was one of a small number of free Black Jamaicans. As a young man, Williams travelled to Britain, where he is believed to have studied at the University of Cambridge. Alongside Latin and poetry, Williams studied astronomy and mathematics, learning about the recent work of Isaac Newton. Williams then returned to Jamaica in the 1720s, where he set up a school for free Black children, in which students were also taught mathematics and astronomy. This was a pioneering example of science education by and for Black Jamaicans. Williams maintained a lifelong interest in astronomy, and in his portrait is pictured with a copy of Newton's book, alongside an astronomical globe. Williams is an important example of the forgotten role of

Black astronomers in history. He is also a reminder of the forms of oppression—in this case slavery—that minority ethnic researchers had to face in the world of science.

Meghnad Saha (1893–1956)

Meghnad Saha was a pioneering Indian astrophysicist. Saha was born at the end of the nineteenth century in British India, in what is now part of Bangladesh. His family was poor and he came from a lower caste background. Despite these obstacles, Saha studied physics in Kolkata, where he later became a lecturer. Saha also spent time in Britain, conducting pioneering research at Imperial College London in the 1920s. Following his time in London, Saha was elected a Fellow of the Royal Society. He was also later nominated (although did not win) a Nobel Prize in Physics for his work on thermal ionisation and the spectral properties of stars. Today, the 'Saha equation' is named after him. Following Indian independence, Saha played a major role in government, serving on the Council of Scientific and Industrial Research under Jawaharlal Nehru before being elected a member of the Indian Parliament in 1952. Saha is a good example of one of the many South Asian astrophysicists who not only made a major contribution to astronomy, but also contributed more broadly to public and political life.

Caroline Herschel (1750–1848)

Caroline Herschel was born in Hanover, in what is today Germany, in the middle of the eighteenth century. However, she spent her adult life living and working in Britain, where she arrived in 1772. Caroline Herschel is often forgotten, or instead simply remembered as the sister of her more famous brother, the astronomer William Herschel. However, Caroline Herschel not only played a crucial role in assisting her brother, but was a significant astronomer in her own right. Most notably, she compiled a star catalogue which was published by the Royal Society in 1802. Reflecting the patriarchal nature of science and

society at the time, Caroline Herschel's star catalogue was however published under the name of her brother, William. Nonetheless, Caroline did gain some recognition during her lifetime, including being awarded an annual salary by King George III for her continued work on astronomy. This made her the first woman to occupy a paid government position in science in the UK.

May Kaftan-Kassim (1928–2020)

May Kaftan-Kassim was a leading Iraqi astronomer. She was born in 1928 in the Kingdom of Iraq, which at the time was officially part of the British Mandate for Mesopotamia. Kaftan-Kassim then came to study physics as an undergraduate at the University of Manchester in the late 1940s, followed by a PhD at Harvard University. Kaftan-Kassim was a pioneer in the field of radio astronomy, later spending much of her career in both Iraq and the United States. Alongside her scientific research, Kaftan-Kassim played a significant role in building up the discipline of astronomy in modern Iraq. She was instrumental in the establishment of the astronomy degree programme at the University of Baghdad. Kaftan-Kassim also helped organise an attempt to construct a permanent astronomical observatory in Iraq. However, with the outbreak of the Iran–Iraq War in 1980, alongside increasing political oppression under Saddam Hussein, Kaftan-Kassim was forced to leave Iraq. She spent the rest of her life living and working in the United States, later serving on the Committee on Space Research of the International Science Council and United Nations Committee on the Peaceful Uses of Outer Space.

As these examples go to show, UK has a rich history which could be used to highlight and encourage diversity in astronomy. Astronomers who studied or worked in the UK have played an important role, not just in scientific breakthroughs, but also in building institutions

and networks. However, these examples also demonstrate the need to proactively address the historical legacies which continue to negatively affect diversity in UK astronomy. Women in astronomy often found that their contributions were not formally acknowledged, or otherwise downplayed. Caroline Herschel is not an isolated example. Famously, the 1974 Nobel Prize in Physics, which was awarded for the discovery of pulsars, went to Martin Ryle and Antony Hewish. This is despite the fact that Jocelyn Bell Burnell, a PhD student supervised by Hewish, first identified evidence of pulsars. Similarly, minority ethnic researchers often faced racism, alongside the consequences of colonialism and slavery. Meghnad Saha was targeted by the British intelligence services during his time in London, in part because of his anticolonial activism. Saha was in fact just one a number of brilliant South Asian astronomers who came to study in Britain. His contemporary, Subrahmanyan Chandrasekhar, described the "prejudice" that Indians faced in British universities, especially when it came to academic appointments. In short, in order to encourage and support diversity in UK astronomy today, we need to better acknowledge and address these historical legacies of racism and sexism in STEM more generally.

Astronomy in UK Education and Media

The most direct and powerful way to encourage greater diversity in UK astronomy is through the national curriculum. As noted by the Science, Innovation, and Technology Committee in its report in 'Diversity in STEM', the current national curriculum does not highlight diversity, either in terms of ethnicity or gender, in the sciences. This is especially true of astronomy. 'Space Physics' is a key named component of the GCSE subject content as specified by the Department of Education. There is, however, no reference to diversity in any form. When it comes to A-level, astronomy is *not* an explicit part of the national curriculum. There is no reference to space or astronomy in the A- and AS-level Department of Education document

setting out subject content. That said, individual exam boards do include content on astrophysics and astronomy within their specifications. AQA, for example, has a dedicated 'Astrophysics' section for A-level. There is no explicit reference to minority ethnic or women scientists in this section. Similarly, accompanying textbooks make little reference to diversity, although to its credit, the AQA Astrophysics textbook does name Jocelyn Bell Burnell as the discoverer of pulsars. To emphasise, this is not a problem of a particular exam board. Rather, the problem is the way in which the national curriculum fails to foreground diversity in the teaching of STEM subjects in general, and astronomy in particular.

As highlighted by the earlier examples, it would in fact be quite straightforward to integrate a diverse historical account of the development of astronomy into the physics national curriculum. There is already a basic precedent for this, as the national curriculum does directly require that students "understand how scientific methods and theories develop over time". The same section of the national curriculum specifies that students should learn to "appreciate the power and limitations of science and consider any ethical issues which may arise". Both of these statements, if enhanced to explicitly include diversity, would provide a simple way to directly encourage exam boards to include content highlighting the historical role of women and minority ethnic researchers in the development of astronomy. Alternatively, a simple statement to the effect of highlighting this diversity within the same section (1. Development of Scientific Thinking) would suffice, such as "understand the diversity of people and cultures who have contributed to the development of science".

Education is the most powerful and direct way that the UK government could encourage greater diversity and interest in astronomy. However, the media also plays a significant role. As it stands, few of these diverse histories of astronomy regularly appear in print and broadcast media, particularly in relation to minority ethnic researchers. There has, however, been much better representation of contemporary UK astronomers, particularly

through the work of Maggie Aderin-Pocock. And there have also been positive efforts to better represent the role of women in UK astronomy. For example, in 2021, the flagship BBC Radio 4 programme 'In Our Time' dedicated an episode to "William and Caroline Herschel". That all said, these examples are the exception rather than the rule. The vast majority of media coverage of UK astronomy is focused on both the historical and contemporary contributions of British men. There is almost no coverage of the role of minority ethnic researchers in the development of UK astronomy historically. Whilst the UK government cannot directly influence the media, it could and should work with relevant organisations to encourage better representation of diversity in the public sphere, which in turn will feed into media programming.

Recommendations and Best Practices

Astronomy in the UK has a rich history which could be better utilised to encourage diversity in science. This history could at the same time encourage greater public interest in astronomy and trust in science. As highlighted, there are many significant figures from minority ethnic backgrounds in the history of astronomy who either studied or worked in the UK. The same is true of the many women who played a significant role in the development of UK astronomy. At its core, this evidence submission recommends much greater use of the diverse history of astronomy to enhance and support UK astronomy in the future.

In terms of education, this aim could be straightforwardly achieved through minor changes to the national curriculum at Key Stage 4 and Key Stage 5. A direct requirement for students to gain an understanding of the diverse people and cultures who have contributed to the development of science would make an enormous difference. The UK government could then work with individual exam boards to ensure a balanced representation in terms of ethnicity and gender within specifications. As noted, there is currently little-to-no diversity in

GCSE and A-level science curricula, especially in subject content on space physics and astrophysics. Alongside working with exam boards, the UK government should work closely with relevant professional bodies to encourage greater awareness of these diverse histories. The Royal Society, the Institute of Physics, and the Royal Astronomical Society are all important partners in this respect, and will no doubt be submitting evidence to this inquiry. Building on existing programmes, such as the Royal Society's 'Inspiring Scientists: Diversity in British Science' project, would bring this message to a wide audience of scientists and teachers. Similarly, the Royal Astronomical Society has a dedicated Committee on Diversity in Astronomy and Geophysics, for more direct contact with professional astronomers.

Finally, in terms of the media, the UK government could work with the heritage sector, particularly Royal Museums Greenwich and the Science Museum Group, to bring together public exhibitions and programmes celebrating these diverse histories. Indeed, both Royal Museums Greenwich and the Science Museum have done much good work around both women in astronomy and, to a lesser extent, minority ethnic researchers in astronomy. Further building on and encouraging these efforts, through sponsoring major exhibitions and funding further historical research, would again enhance public understanding of the diversity of people and cultures who historically contributed, and continue to contribute, to UK astronomy. Encouraging greater awareness of diversity in STEM not only ensures greater equity in society, it also helps to increase public interest and trust in science more generally.

About the Author

Dr James Poskett is Associate Professor in the History of Science and Technology at the University of Warwick. His research focuses on the global history of science and technology from the early modern period to the present day. Before joining Warwick, Poskett completed a PhD in the History of Science at the University of Cambridge and held the Adrian Research

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Disclaimer

The opinions expressed in this document are solely my own and do not necessarily represent the views or opinions of my employer.

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Further Reading

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