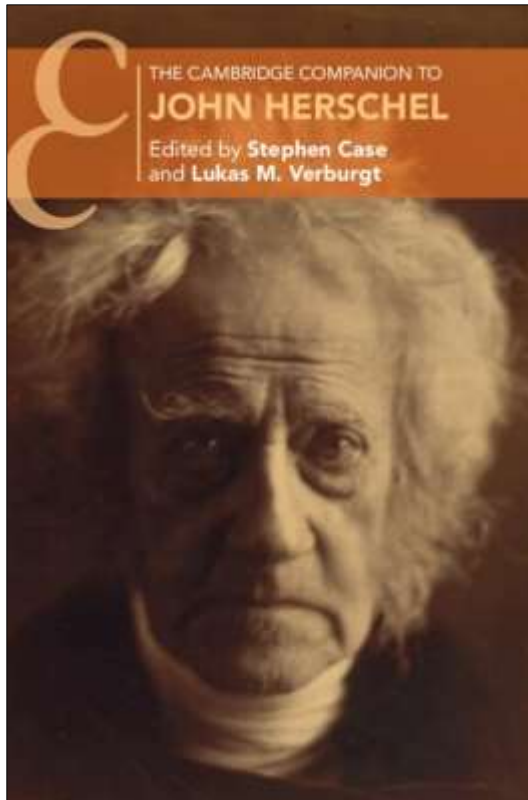


chapter about John's astronomical observations at the Cape, South Africa. It was nine years after his return to England that the *Cape Results* was published (Herschel, 1847). "By and large, the praise was effusive, but there were criticisms as well." (page 94). The analysis is left to die with that sentence, and it would have been nice to learn more without having to locate and then read Ruskin's (2004) book on *John Herschel's Cape Voyage* ...

It is only in the chapter by Verburgt that we get on firm ground:



This chapter provides a brief overview of the available literature in Herschel's *Preliminary Discourse*. In doing so, it attempts to both improve upon and go beyond current Herschel scholarship. (page 99).

Verburgt delivers in this analysis of Herschel's 1831 book, which "...surveyed the historical development of the sciences, but also connected them to religious and social themes." (page 103). Since the *Preliminary Discourse* is only of tangential interest to astronomers, I will just note one major insight here. "Historians are caught in a hall of mirrors when trying to answer whether or not *Preliminary Discourse* was Baconian." (page 108). Verburgt does a superb job of elucidating this issue by examining inductive and deductive paths of inquiry, and the "... value of hypothetical speculation in scientific in-

quiry." (page 111). "Herschel believed himself to be redefining Baconian induction," writes Verburgt (*ibid.*), but "he did not go so far as to suggest that induction is grounded on probability." (page 119).

In a chapter on the art of drawing scientific observations, Omar Nasim (University of Regensburg) brings our attention to the fact that

A full third of the four years of nightly observations at the Cape of Good Hope were dedicated to drawing nebulae at the eyepiece of his large twenty-foot reflector. (page 146).

In all, the *Cape Results* included 58 drawings. Nasim describes the extensive drawing process, which involved a network of triangles on so-called 'working skeletons' that formed the substratum for the drawings.

A chapter on Herschel's photographic work tells us Herschel ... "started a series of photographs of the telescope scaffolding ..." in 1839 (page 168). Annoyingly, none of these is included in the book. Other chapters explore his engagement with politics, interest in the geology of Earth, and his work to promote the standardization of measurement practices across the globe. This included weights, time, music, and "... a fervent campaign against the metre." (page 221).

This book checks off most of what one might expect in a set of introductory surveys of John Herschel's life and career. But we must wonder how many more years we must wait for a book that does justice to a scientist who died 154 years ago.

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Diversity, Equity and Inclusion in Modern Astronomy, by Jörg Matthias Determann. (Amsterdam, Springer Verlag, 2024). Pp. xiv + 184. ISBN 978-3-031-46112-5 (hard-back), 160 x 240 mm, Euro 145.59.

The concept of diversity, equity and inclusion, often shortened to DEI, is a current and politically charged concept, mainly in the USA. In the Presidential election of 2023 it

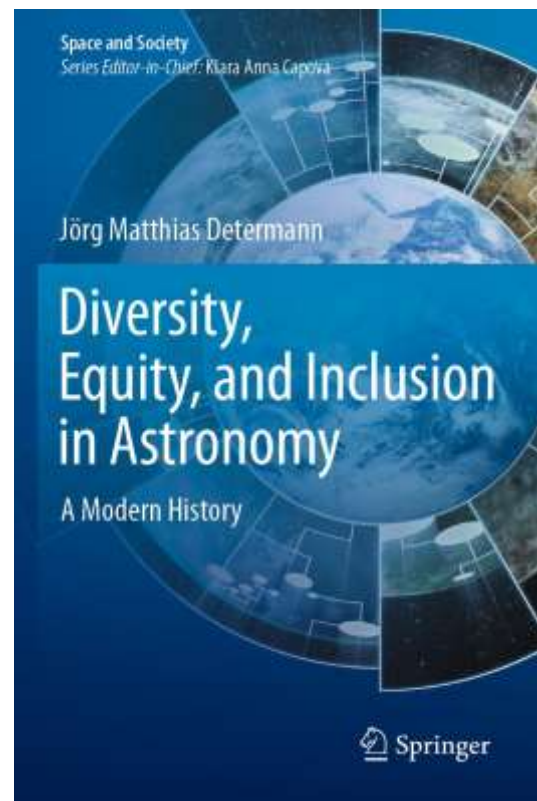
provided a 'rhetorical fault line' between Democrats, portrayed as pro-DEI, and Republicans, mainly, or totally, anti-DEI. Broadly speaking, DEI is a descendant of the positive discrimination programmes characteristic of affirmative action which began in the US in the 1960s and which sought to challenge the then dominant position of white Europeans, and white men in particular, in US society.

The terms diversity and inclusion are fairly straightforward in their aspiration to include wider sexual, social and ethnic demographics in any social network or institution, beyond the once ubiquitous white men. Equity is a more difficult term for, while it is usually distinguished from equality in terms of equality of opportunity, it is unclear where the boundary lies between the two words. The IAU (2021) uses the term equity, but its aspirations seem to reflect a just aspiration for equality. One distinction holds that, while equality promotes fairness amongst groups, equity deals with individual needs, recognizing that one person may be simultaneously a member of multiple disadvantaged—or conversely, privileged—groups (Frederickson, 1980: 37). While equality removes obstacles to achievement, equity provides assistance to groups identified as disadvantaged. Equality deals with equality of opportunity, and equity with equality of outcomes.

The standard critique of equity as the term is applied to academic and professional contexts is that it, as a result of prioritising minority or disadvantaged status, it challenges requirements for skill and ability as the prerequisites for success. Determann reports on one such exchange. When Chief Justice John Roberts asked in December 2015 "What unique perspective does a minority student bring to a physics class?" (Conover, 2016), Jedidah Isler (2015) responded that "... if we limit the physics classroom to white students, we also limit the production of new information about the world."

In support of diversity, the Nashville Recommendations of 2016, arising from the Inclusive Astronomy conference of 2015, asserted that "... diversity leads to greater innovation, more creative thinking and higher quality science ..." (page 143). In other words disadvantaged people lack skill or ability precisely because of their social, ethnic or gender disadvantage, not because of any innate lack of ability (page 112). But both Isler and the Nashville Recommendations adopt functional rationales: people with different personal backgrounds do astronomy in different ways and astronomy as a whole will therefore

benefit from their participation. To which the advocate of pure science might ask why a black student, or a transgender student, would be likely to produce different knowledge to a white one: what data, they might add, could Isler produce to support his proposition or that would justify the Nashville Recommendations? An alternative to the functional argument would be to simply argue that everyone has an equal right, as a human right, to education in astronomy, if that is their choice. The debate is thus never ending. Above all, though, DEI currently both occupies a controversial position in US politics, and is part of a complex intellectual web of wider political contexts. On a global level these extend to



the United Nations Sustainable Development Goals (page 3).

Jörg Determann's book explores the DEI debate in relation to the worlds of professional and academic astronomy, mainly in the USA. The book is both a closely argued history of political pressures in and on astronomy, and a valuable contribution to the emerging academic field of cultural astronomy, exploring the culture of astronomers themselves. As Determann writes (page 11), by the 2010s there was a widespread sense that a new social movement was taking over astronomy, with an ideological polarization between supporters of pure science on the one hand, and those for whom science can be socially contextualized on the other, and a

parallel demographic division between the once dominant white men, and newer gender and ethnic diversity. The ideological and demographic binaries do not always overlap and a notable supporter of science as separate to politics is Neil de Grasse Tyson, whose heritage is part African American (page 13). Women, such as Sandra Faber (page 155), can also be accused of racism. The Indian-born Shrinivas Kulkarni at CalTech was accused of sexism (page 78). It is not therefore, a single aspect of one's identity that determines one's degree of privilege or marginality, but one's total identity: this is at the heart of intersectionality. The debates and competing positions, as Determann writes, are therefore in flux (page 11).

Running through the book is therefore a debate about whether astronomy is a 'pure' science, an impartial quest for objective and universal truth irrespective of philosophical or ideological contexts, or whether it is culturally contextualised. Determann introduces this question early on. He cites Stefania Varano of the Italian National Institute for Astrophysics defining modern astronomy as meritocratic, 'democratic', 'fair' and based on

... observations [that are] impartial because they are mainly made of numbers, representing the physical features of the observed object. (page 13).

Or, as Martin Rees, the UK Astronomer Royal argues (Rees, 2018). "Science is the one culture that is truly global." The problem then arises as to whether DEI introduces politics into astronomy, or if it is there already. In 2018 Alessandro Strumia from the University of Pisa gave a paper claiming that male authors were cited more than female authors on the grounds of merit. The obvious riposte to Strumia would be that most astronomers are male: in January 2023 79% of International Astronomy Union (IAU) members were men, a figure that decreases to 67% for junior members, indicating a likely shift over time (IAU, 2024). Other evidence suggests that there might be more female astronomers, just that they don't show up in IAU statistics (page 48). That most IAU astronomers, though, are men is an artefact of the factors that DEI is seeking to overturn, both past educational opportunity (favouring men) and choice (with fewer women who did have access to higher education choosing science subjects). Chanda Prescod-Weinstein from the University of New Hampshire responded that the numbers of citations favouring men could result from unconscious bias, to which Strumia replied

that he was a victim of cancel culture. Moreover, the US astronomy community remains 91% white (page 171).

Whether the fact most US astronomers are white men, and whether this has any significance for the 'pure' science of astronomy, or represents an injustice in that, for example, to be a woman or to be non-white is an obstacle to participation in astronomy, is the central topic that Determann analyses through six chapters engaging with disability, race and gender, and theoretical issues such as decolonization and intersectionality.

Chapter 1 is about the major historical, political, and religious contexts for astronomy. Determann deals with these as one, writing that:

Already in the late 19th century, communists, socialists and anarchists in France and elsewhere were attracted to astronomy, seeking to find a new cosmology for the revolutions they pursued. Spreading modern knowledge of the heavens, they thus also sought to replace religious world views with scientific ones and to dismantle older hierarchies. (page 16).

In other words, astronomy serves a purpose both because it is science, in that it can show that there is no need to hypothesise a God, or gods, or any divinity, who created the Universe, and because, in doing so, it can encourage social and political reform. Astronomy, Determann points out, also serves conservative political goals, as it did in former centuries when astrologers provided political services (Harlow Shapley was particularly cutting on this point) and as it does in this century when, in the service of military matters, it becomes, as Neil de Grasse Tyson put it, an "... accessory to war." (page 12).

The religious issue, though, is not settled. Even though astronomers such as Shapley and Bart Bok (page 21) saw atheism as the logical outcome of astronomy, for others, such as Owen Gingerich, there was no conflict between science and Christianity. Why shouldn't God create a Universe which operates according to mathematical principles? Ultimately the debate can never be resolved for there can never be a proof that God does not exist. Although Determann does not develop the point, the micro-debates he documents throughout the book could all be framed either as religious or political, and all are equally unresolvable. He takes the position, as an historian should, of the disinterested observer, reporting the ebb and flow of the

respective arguments as clearly and non-judgmentally as he can.

Chapter 2 continues the political theme, focussing on attempts at international collaboration (for example, in observatories and at the International Space Station) and development. The concept of education in astronomy as a public good was represented by the IAU's merging of Commissions 38 and 46 in 2000 into a new unit that included programme groups for 'Teaching Astronomy for Development' and the 'World-Wide Development of Astronomy' (page 41). Living under 'one sky' (page 42), astronomers therefore have to navigate a world that is divided amongst sometimes hostile nation states. Astronomy's quest for universal truth regardless of competing countries and ideologies is therefore necessarily political.

Chapter 3 deals with sex and gender, including the foundation of the Committee for the Status of Women in Astronomy in 1979, sexual harassment of female astronomers by men (page 59–65, 74–82) and underrepresented minorities (Black, Hispanic and Tribal—or what we would now call 'First Nations'). In 2000 such groups represented 25% of the US population but only 2–3% of astronomers (page 67). The chapter concludes with gender activism and 'identity entrepreneurs' (page 83).

Chapter 4 moves on to racial politics, recognising the gender issues dealt with in Chapter 3 via claims of the harassment of black woman astronomers by their black male counterparts. Determann documents attempts by African-American astronomers in the US to engage with African culture, notably Jarita Holbrook's pioneering 2003 film, *Cosmic Africa*. Holbrook was an advocate for 'ethnoastronomy', but ran into criticism, in what she termed the 'science wars' from advocates of astronomy as 'pure' science, who dismissed the concept that 'indigenous' astronomy could be compatible with scientific astronomy (pp. 98–100). Holbrook, meanwhile, was critical of the view of many of her US colleagues' that social scientific and humanistic research is suspect and does not count as 'real science'. She identified her own intellectual home as 'cultural astronomy' and her relationship to STEM as the marginalized one characteristic of women and ethnic minorities. Holbrook's later Keynote Address at the 2019 IAU Symposium on Astronomy for Diversity, Equity and Inclusion was titled 'Using Cultural Astronomy to Create a More Inclusive Astronomy' (page 150). The chapter then moves on to the be-

ginning of DEI initiatives in astronomy.

Ethnoastronomy, though, is a complex term, making assumptions about what it is to *be* ethnic, or what ethnic astronomy *is*. The issues are brought into sharp relief by the term *ethnoscience*. As [Stewart \(2015\)](#) wrote:

Ethnoscience is a one-word conundrum, since its two parts – “ethno” and “science” – are in tension, if not outright opposition. Science is culture-free by definition: science claims to be universal knowledge, which applies equally everywhere. The prefix “ethno” has the meaning of “cultural,” so the word “ethnoscience” literally means “cultural science.” This notion of “cultural science” flouts the criteria of science and is denied by most working scientists.

The question of ethnoscience as 'other-than-science', was raised by [Raphael Uchôa](#), [Staffan Müller-Wille](#) and [Harriet Mercer \(2024\)](#):

We began with a fundamental, if naïve, question: under what historical and epistemological conditions did Western scientists start to rethink their attitudes to non-Western/Indigenous forms of knowledge, moving away from their derogatory notions of “savage” or “primitive” knowledge to the more equitable twentieth-century term “ethno-science”? In the course of our reading sessions, however, we began to appreciate that the ethnosciences represented another instantiation of a long tradition of defining science in relation to “other” knowledge systems.

As applied to astronomy, then, is ethnoastronomy, 'other-than-astronomy', or an extension of a colonial view of what constitutes proper knowledge? [Uchôa](#), [Müller-Wille](#) and [Mercer \(2024\)](#) conclude in a positive vein:

Each unique context presents a plethora of historical sources and gives rise to epistemological challenges tied to the (in)commensurability of knowledge systems and classifications. Numerous issues, geographies, and institutional and political contexts remain unexplored.

It is precisely these issues, geographies, and institutional and political contexts that Determann addresses. [Alejandro Lopez \(2011: 41\)](#) picks up the question, pointing out that “Historically, ‘ethnicity’ was a term that referred to societies different from the academic ‘West-

ern' culture." And here lies the problem: 'ethnic' is defined as non-white, but what grounds do we have for demarcating knowledge systems on the basis of skin colour? If we take science as a guide, who is to argue that non-white astronomy does not include science? Lopez (ibid.) continues:

On the other hand, when we study a culture that is very close to us—such as the academic astronomer's own—we run the risk of taking some key concepts for granted ...

Moreover,

Concepts such as space, territory, person, body, identity, and culture cannot be taken for granted. (Lopez, 2011: 40).

Hence, neither can terms such as 'ethno', 'science' or 'astronomy' be taken for granted. These debates are central to the History and Philosophy of Science and the implications of Determann's work is that we need to add Philosophy of Astronomy to existing work in the history of astronomy. The questions arising from Determann's narrative are complex: is ethnoastronomy the astronomy of ethnic groups, defined not by its content, but by the ethnicity of the practitioners? In that case, if US astronomers are 91% white (page 171), why isn't scientific astronomy an ethnoastronomy? Is ethnoastronomy somehow lesser than scientific astronomy and, if so, what makes it so? Is that it is based around stories? In that case what about the stories attached to scientific astronomy (e.g. the awe and wonder of the sky)? Do different ethnicities have different astronomies? What about the Chinese and Indians? What about when Western astronomy was concerned with the effects of the stars (Ptolemy, 1940) or their mythology (Manilius, 1977). Was that not astronomy? Is ethnoastronomy just 'non-white'.

All these questions also concern the use of the term 'indigenous', another contested word, as Uchôa, Müller-Wille and Mercer (2024) point out. Regarding astronomy, Clive Ruggles (2009) argues that there are certain key features of indigenous thought: it aims at 'keeping in harmony with the cosmos' by recognising an interconnectedness between all things which contrasts with such binary features of some Western thought such as the mind/body split, or a distinction between thought and action, and therefore social structures. In this respect, the work by Duane Hamacher (2019; 2022) on Australian indigenous astronomy is significant. The description of his YouTube presentation argues that

it "... contains a significant scientific component, which is encoded in oral traditions and material culture." If indigenous astronomy can be scientific then it stands equally with the tradition of Western astronomy, rather than being an 'other'. Lopez (2011: 41) makes a similar point in critiquing the concept of ethnoastronomy:

It follows that the term 'ethno-' should not be applied solely in reference to aboriginal groups or other 'minorities' in relation to their dependence on the global capitalist system. Instead, it should signify a particular approach to the study of all social groups, an approach that can deal with any society. One of the methodological cornerstones of such an approach is the deconstruction of what the researcher regards as common sense: in other words, the recognition of the researcher's own habitus.

In other words, methodology rather than ethnicity is the key issue.

Chapter 5 extends the discussion of sex and gender, partly through biographical information on the scientific work of women such as Wanda Díaz-Merced and Fiorella Terenzi, who challenged the idea of the scientist as male or obsessed by quantification, together with the image of Albert Einstein as the model for genius. (As a counter argument Stephen Hawking, male, whose motor neuron disease eventually killed him, and whose image comes close to that of Einstein as the lone genius, significantly encouraged the provision of disability access (page 144-5)). Determann records (page 141) that in her book, *Heavenly Knowledge*, Terenzi wrote,

There is a growing campaign among my female colleagues in all of the sciences to give a human perspective to our work, to create a science that aspires to cooperate with Nature rather than to only quantify it ... a science that [converses] with Nature [rather] than by putting it on the rack to force it to reveal its secrets ... a science of Venus rather than a science of Mars.

Such statements raise in sharp relief the issue of pure as opposed to socially contextualised science: if Terenzi wants an astronomy that cooperates with Nature, what exactly does this mean for the process of observation and measurement? Or does she suggest that astronomical research methodology remains the same, but the communication of results becomes more accessible?

In which case, this has been attempted before by male astronomers and science popularisers. Where, then, does the female participation in astronomy become distinctive? Terenzi is also reported as saying that her Italian accent becomes a disability in an English-language context. In which case, one might suggest that anything can become a disability in any context: her accent would not be a disability in Italy. And then the question becomes, what compensatory measures does the principle of Equity require in order to place the person disabled by accent on an equal footing with one who is not. And how does one judge what is a disability? A survey in 2013 found that 2% of American Astronomical Society members were disabled, as opposed to 20% of the US population as a whole (p.143). But such headline figures do not take into account the nature or severity of the disability: to be blind is likely more of a disability for an astronomer than to have difficulty walking, and to be totally sightless worse than having a mild visual impairment.

Determann also documents how, at the extreme end of the spectrum, an attempt to include one group of people might exclude another. For example, the Inclusive Astronomy conference in 2015 aimed for the use of simple language but used the acronym 'LGBTIQA*' which, even when explained (as it was in an appendix) might break the simple language rule. Disability itself can also be compounded by being female, a person of colour, or 'LGBTIQA*'. It is reported that such people frequently experience discrimination and micro-aggressions.

Chapter 6 then starts by examining the toughest recent encounter of organised astronomy with a countervailing cultural force—the conflict over the construction of the Thirty-Metre Telescope at Mauna Kea in Hawaii, which erupted in 2014–2015. Determann recounts the response of Prescod-Weinstein and others, which was that the hierarchy in academic astronomy was indelibly sexist, racist and white supremacist and that its power structures need to be torn down (page 157). Prescod-Weinstein added that science as a whole had to be freed from commodification and needed to be decolonised. Determann also observed Prescod-Weinstein's use of language, noting (page 158) that she called Isaac Newton, for example, a 'complete asshole' in her book, *The Disordered Cosmos*. The supporters of pure science rallied against such discourses. Lawrence Krauss objected that no data were provided to support the claims of racism in science,

and that concepts of dominance and oppression were inappropriate imports from cultural studies (actually, specifically from critical theory) in order to impose an ideological framework on investigation of the natural world and undermine objectivity in science (page 161–162). Determann's analysis therefore ends where it began with the key binary issue of whether astronomy is pure science or culturally conditioned still unresolved, at least as far as the debates he reports are concerned. The solution, of course, may be that astronomy can strive for objective truth but that the kinds of questions that astronomers ask in the first place may be culturally contextualized, a position easily justified by the history of Western astronomy. Determann concludes on a positive note, returning to astronomy's aspirations as a global peacemaker, transcending national rivalries. Referencing the Overview Effect, he cites Mike Simmons, the founder of Astronomy without Borders, who stated:

We gaze skyward from different windows on spaceship earth, marvelling at the universe our small planet is part of, recognising that we really are all in this together. (page 175).

Determann has performed an astonishing task in the sheer detail with which he has covered the application to astronomy of a controversial contemporary phenomenon in Western, primarily US, culture. He has documented numerous books, papers and websites, and conducted 45 interviews with key protagonists and his book stands as a major contribution to the recent history of astronomy, dealing with cultural questions rather than technological or scientific ones. It therefore takes a major step in the expansion of the field of cultural astronomy to the examination of the culture of modern academic and professional astronomy.

There are four issues that I would like to have seen discussed further. One is religion and the question of how people of faith negotiate an arena in which the scientific assumption that the correct religious perspective is atheism. Determann covers some issues, but are there any statistics on the number of astronomers who have various kinds of religious or spiritual affiliation? How do Hindu astronomers fare in the USA? Do their atheist colleagues regard them with disdain? What about evangelical Christians or neopagans? Are these groups represented in professional astronomy in proportion to their numbers in the wider population? And how do they fare in a DEI context? Deter-

mann mentions Mormon Women astronomers, but how would they feel about biological men entering women's spaces? And how might a devout Catholic female, person of colour astronomer feel about the same issue? Or about their research results being interpreted in a social context.

This leads on to a second question, the fractured nature of the groups who are supposedly all encompassed within DEI. Since the US Rainbow Coalition of 1969 there has been an assumption that all people who do not share the epitome of privilege in a capitalist society, i.e., in the US, wealthy, protestant, educated white men, must share a common political goal. DEI has inherited this. Yet the assumption quickly breaks down: where is the communal interest, for example, between wealthy gay white people and poor urban blacks in the USA? In terms of modern US astronomy, in 2020 the Committee for the Status of Women in Astronomy proposed to welcome biological men

... who identify as female, including trans women, genderqueer women, and non-binary people who are significantly female-identified. (CSWA, 2020).

Yet such non-biological definitions of women are massively controversial amongst women themselves, including radical feminist supporters of gender critical theory (Bindel and Kay, 2023). There are also consequences to consider. How significantly female-identified does a man have to be before he counts as a woman, an issue previously raised by transwomen (Geek Feminism, 2014). How many such men would have to join the Committee before they are in the majority? (The answer is seven). And, to pursue the thought-experiment, would it be acceptable if all twelve committee members were biological men? The current logic is, yes, it would be. In that case, what is the point of having a women's committee? DEI appears to have sabotaged the original intent. Another question opens up: If astronomers reject concepts of biological science, why should biologists (or any other scientist) accept astronomical claims? If astronomers challenge notions of what a man or a woman is, why should anyone accept astronomical notions of, for example what a planet is? If male and female are social constructs, then are such categories as star or galaxy equally social constructs? There are, of course answers to these questions, but the positions are polarised and difficult to resolve. Determann deserves thanks for bringing the underlying debates to our

attention.

DEI itself largely relates to a US model and the adoption of ideologies such as critical theory, intersectionality and white privilege. This model, which sees racial groups as existing in hierarchies of relative privilege disadvantage, with white people occupying the greatest power, also has its critics. There are a number of criticisms. One is that it removes the complexity of real cultural interactions, with, for example, East Asians being combined with Africans and Latinos as underprivileged. The acronym used in the UK until 2022/2023 for all non-white people was BAME, or Black and Minority Ethnic, but this was discontinued after, first, individuals classed as BAME objected (BBC, n.d.) and it was discontinued by the UK Government (Race Disparity Unit, 2022) and generally regarded as no longer useful (Gill, 2024; Sim, 2024). The second is a general assumption that only white people are racist (DiAngelo, 2016), a claim which has been widely repeated (Dwyer, 2015). There is some evidence that white people may be more racist than other groups (Ahmed, 2023). The problem with this assumption, though, is that it does not account for varieties of racism in other cultures, such as anti-black racism in China (Cezne and Visser, 2024; Sautman, 1994) or India (Mampilly, 2022; Prabhu, 2017), or anti-white racism in Japan (Vidal, 2025). Paradoxically, DEI is therefore a parochial example of US colonisation, projecting the US experience of race around the world and therefore a true decolonising agenda would oppose it. The issue is not one of equality of opportunity, but of the other ideological frameworks which accompany DEI. The internal contradictions in DEI's logic has led to accusations that it is fundamentally religious (McWhorter, 2021). In this case the exponents of DEI in the astronomical community are importing a religious perspective.

The third point, following the second, is who does inclusivity include? The Conservative website Campus Reform (2024) campaigns for conservative students who feel disadvantaged in an environment in which a majority of US college professors are socially liberal and Democrat voters (Langbert and Stevens, 2020), while 78% are said to have voted for Harris and only 8% for Trump (Nietzal, 2024). The appeal for new members of Campus Reform adopts the language of gender and ethnic marginalization:

Conservative students on college campuses are marginalized, threatened, and silenced by threatening

students who oppose their views, or radicalized leftist professors or administrators. (Arns, 2024).

In other words, where does oppression, disadvantage and marginalization in the USA begin and end, and are all minority political positions to be included in DEI, or only some? The Democrat majority amongst college professors extends to biology (9.4 Democrats to one Republican) and chemistry (4.5 Democrats for every Republican), but I could find no data for astronomers. Quite aside from what Determann identifies as the movement for social reform since the 1970s, have astronomers always been socially liberal?

The fourth point concerns the philosophy of science. The question raised by Determann's text is whether all astronomers should agree on the results of astronomical data regardless of their background, and how this issue relates to particular instances. The consequences are not always clear. Neil de Grasse Tyson, an advocate for the position that science is universal, objective and neutral, argued that Pluto should be demoted from its planet status. He did so on evidential grounds but, as soon as the renaming had been proposed, the issue became one of language and taxonomy, not just data. As Gibor Basri said, if we live on a planet, it would be nice to know what a planet is (page 103). Therefore, what does it mean to say that Pluto is a planet or, alternatively, is a dwarf planet? Are these scientific questions, or not? But not all astronomy is scientific. As Determann writes, 'Astronomers of different identities existed for as long as humans have looked up to the sky and wondered about the universe' (page 11). In that sense there may be a scientific methodology that seeks for truth about the Universe, but what of Holbrook's ethnoastronomer who might be a priest, shaman, calendar-builder, myth-maker, or story-teller (as well as, for Hamacher, a scientist)? Quoting the Zimbabwean Shazrene Mohamed's statement that 'The Sky is for Everyone' (page 11), Determann writes the "... the sky, was in principle accessible to almost anybody." Anyone can therefore be an astronomer.

It would also have been helpful to have had a brief introduction to such key theories as decolonization and intersectionality, which are mentioned but not defined. Determann's bibliography is huge and serves as a magnificent starting point for anyone who wishes to explore his hundreds of sources. Yet the index, over which he would have had no control, is completely inadequate. It does not

include names, omits major terms such as 'science', and has no entries at all for the letter 'c'. Whoever at Springer allowed this through should be ashamed of themselves and I hope that the series editor-in-chief has issued a strong complaint. If not, they should do so now, as Determann's astonishing and detailed documentary research has been poorly served in this respect, along with the interests of his readers, as well as Springer's reputation.

Dealing mainly with the twenty-first century, but necessarily with reference to antecedents in the twentieth, mainly from the 1970s onwards (page 17), Determann has produced a vital source book through his accounts of the many debates, claims and counter claims in papers, on web sites, and at conferences, along with his interviews with key figures. Determann states at the outset that his narrative is concerned "... with the broader movement for social change within astronomy ..." (page 11) and he has documented this with great care. Alejandro Lopez (2011: 38) argued that, since cultural astronomy deals with social issues it should employ social science methods. We can expand his suggestion to argue that, as cultural astronomy actually deals with culture in its broadest sense, we should also include disciplines from the humanities, such as history and the study of religions. No application of astronomy in culture should be excluded from the cultural study of the contemporary suppositions, assumptions, claims, counter-claims practices and social uses of astronomical science, symbolism and imagery. Determann has opened the path to such studies.

Overall, this is an important and thought-provoking book, which provides a valuable addition to the work on the history of modern astronomy, and of the emerging field of cultural astronomy, a reminder that astronomers, like any other professional group, have a culture. Determann should be congratulated for opening complex new academic terrain with sensitivity and rigorous attention to detail.

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***The Clock in the Sun: How We Came to Understand our Nearest Star*, by Pierre Sokolsky. (New York, Columbia University Press, 2024). Pp. xxiii + 221. ISBN 978-0-231-55458-0 (hardback), 140 × 220 mm, US\$32.**

The author is Pierre Sokolsky, an experimental particle astrophysicist. He is Distinguished Professor of Physics and Astronomy Emeritus at the University of Utah.

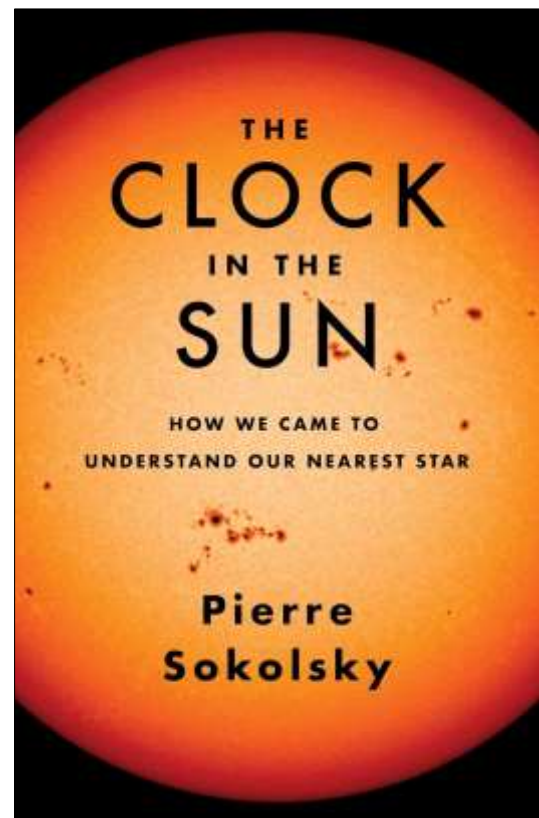
The Sun is barely mentioned in the first three chapters, which feature lengthy digressions on all sorts of topics. Even when the topic is astronomy, there are no solar rays to illuminate the page. For example, Sokolsky devotes an entire page to a quote from Chinese records in the year 1387. It includes mention of the Moon, Venus and Mars occulting "... the asterism of Kings ..." even though we are not told what this asterism is (page 36). The Sun is not included in this full-page quote. When William Herschel is discussed, irrelevant details of his life span page 86–89, with nothing about the Sun until the last paragraph on page 89.

The author devotes a full page to the discovery of certain spectral lines that were (in 1939 by Walter Grotrian) interpreted as highly ionized iron atoms in the Sun's corona (page 203). He bases this on the 'discovery' of the lines by Charles Young and William Harkness at the 1869 total solar eclipse. But Norman Pogson (Director of Madras Observatory) had already discovered the double green line during the August 1868 total solar eclipse (Nath and Orchiston, 2021). For a popular science writer to be unaware of this is forgivable, but to have missed this important historical point in a book on the history of solar physics is most unfortunate! Since the author begins the book by stating that "I am neither a specialist in solar physics and astronomy nor a historian of science ..." (page

vi), this highlights the importance of having manuscripts thoroughly reviewed by relevant scholars before submission to a publisher.

Unfortunately, this is not the only instance where the available literature has been ignored. How the Sun was understood in Roman times, for example, is not even mentioned. Sokolsky skips from Ptolemy (who is described only as an astronomer working in the Greek tradition, even though he was born in Roman Egypt) directly to Islamic astronomy. The work of Hijmans (2024), much of which was available in his PhD thesis of 2009, unfortunately is ignored.

Sokolsky describes the so-called Maunder minimum. Edward Maunder (1858–1921) found "...that sunspots had almost vanished



between 1650 and 1720." (page 180). As an overlap in time, Edmond Halley asserted "... that no prominent aurorae were seen in England from 1574 to 1716." (Cunningham, 2016: 31). As I showed in that 2016 study, Halley was mistaken: the great aurora of 1621 was seen over Europe and England, another prominent aurora was visible from London in 1661, and to add a European sighting "Cassini observed aurorae several times in Paris early in July 1687." (Hogg, 1947: 36). Sokolsky never mentions Halley in a discussion of all this. Instead, he simply states "The second half of the seventeenth century was deficient in sunspots and auroral