Universality as Horizon: Aspirations and Geometries of Astrophysics in Africa

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Abstract: For astronomers in Africa, both amateurs and professionals, the universality of the scientific investigation of the universe holds out the promise of navigating inequalities on earth. Universality is attractive: it allows astronomers from Africa to enter the global field of science diplomacy and provides them with a discursive framework in which to combat the structural inequalities of participation. Rather than taking universality as a descriptor for science, this article is inspired by Paulin Hountondji's formulation of universality as horizon and speculatively elaborates this metaphor. Drawing on two ethnographic case studies, one on the spatial geometry of a Malagasy amateur astronomer, the other on the crafting of a vision document by and for astronomers in Africa, the article explores how different notions of 'horizon' are evoked in each case. In so doing, the article engages with the temporal and spatial aspects of universality and shows how this concept can elicit hope, provide direction and enable an examination of position-based particularities.
[universality, horizon, Africa, astronomy, science]

> When you speak with someone who is many thousand kilometers away from you and you speak about the same thing, then you are on the same wavelength. Technology helps a little. […] Astronomy, for example, can be a common point between me and that other person. We talk about the moon: 'Do you see the moon at your place?' She says: 'yes.' In such a conversation, there are no longer any state boundaries. […] They don't exist anymore, unless, let's say, there are people in France and they ask me 'Do you see the polar star?' – 'No, I don't see it.' But on the other hand there are objects like Orion. 'Do you see it?' – 'Yes, but I see it upside-down.' When it's like that there are no longer terrestrial boundaries, it's universal then. (Benja)

Benja, president of an amateur astronomy club in Antananarivo, Madagascar, is passionate about astronomy. He is in his late twenties and recently finished his Master's degree in science education. When a student, he invested a lot of time and energy in turning the astronomy club into a vibrant hub for various activities, such as public stargazing events, public talks about astronomical topics, or participation in internationally organized awareness days for the pale blue dot, for example. While looking for an opportunity to do a PhD, he was working as a science teacher and found it very difficult to continue being the driving force behind all of these events, so he trained other people and slowly handed responsibilities over to them. I have known Benja since before this

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transition. In fact, I first met him in 2019 when I was visiting Madagascar for a brief exploratory period of fieldwork. Having heard about my research, he approached me, and I was immediately captured by his enthusiasm for astronomy, which he links to his concern and care for our place in the world. From the very beginning, Benja became one of my key research participants and shaped this role actively, keen on understanding my research questions. We stayed in touch throughout the pandemic, and in 2022, when I returned to Madagascar for four months of ethnographic fieldwork, we intensified our communication, already knowing that we were interested in each other's interests. We shared many thoughts about the universe, Africa, Madagascar and its capital Antananarivo. Over this time, Benja explained to me how his sense of living on a remote Indian Ocean island changed as he turned his attention to the night sky and thereby became connected to a global community of astronomy enthusiasts. As a result, he discovered that astronomy, with its gaze directed towards the sky, provides a geometry that enables people across the world to connect and become part of a larger framework. Celestial objects may become 'common points' in the physical universe to which people located in different places on earth can refer. When they are attuned to 'the same wavelength', they can potentially transcend the limitations of 'state' or 'terrestrial' boundaries. Not all the time, though; people on earth's southern hemisphere cannot see the Pole Star, and people in the north cannot see the Southern Cross. The earth itself is in the way of an omnidirectional viewing of outer space; from the surface of the planet, a particular horizon always defines the limitations of views into the cosmos. Despite this caveat, many celestial objects can triangulate people's positions on earth and thus help them to connect, which is what excites Benja. But Orion is 'upside-down', he says. The triangulation does not erase differences in perspective, and in Benja's formulation we can detect the persistent normativity of defining the orientation of constellations of celestial objects. Still, Benja is excited for this exchange to be possible at all. He is excited about sharing 'a common point' in the night sky with someone from France and the sense of connection that brings.

In this article, I pick up on the geometry that Benja expresses and trace how the objects of astronomical interest become intertwined with astronomers' situatedness on earth through two different but related conceptions of science's universality. To illustrate this process, I draw on both my conversations with Benja and insights from my ethnographic engagement with a meeting of astronomers in Africa.

In 2021, a couple of months before my conversation with Benja, I participated in the 'Forum on Astronomy in Africa', hereafter 'Forum', a three-day online meeting organized by the International Astronomy Union's (IAU) Office of Astronomy for Development (OAD). Attended by over 400 participants, this event was designed to acquainting them with the various astronomy initiatives on the continent and to prepare them for the IAU General Assembly (GA), scheduled to be hosted in Cape Town in 2024. The GA is the world's largest astronomical conference, taking place triennially and bringing together astrophysicists from across the world. In more than a hundred years of the IAU's existence, 2024 marks the first time that the GA will be held in

Africa, and astronomers across the continent have been invited to join the excitement. 'This is not about South Africa; this is about Africa – to make sure we all combine our forces, our resources to build skills and capacities, to strengthen our institutional mechanisms, our facilities, to make sure that we can give hope to young and upcoming astronomers', as Takalani Nemaungani, Chief Director of the South African Department of Science and Innovation, said in his introductory words to the Forum. Indeed, the Forum was designed to foster the understanding that this GA was not just taking place *in* Africa but *for* Africa; it was to happen in Cape Town 'on behalf of the African continent' and 'to leave a legacy', as Vanessa McBride (OAD) stated. The Forum was highly affective, fostering pride and appreciation that this GA would be an opportunity for both Africa and its astronomers. Although I was sitting at my desk in Europe and am not an astronomer myself, I became caught up in the meeting's atmosphere, felt increasingly excited as it went on, fervently wrote field notes and occasionally took screenshots. While the Forum was one of my earlier exposures to the OAD's activities, my writing is informed by my subsequent attendance at numerous other online meetings over the next few years, as well as further personal communication with some of the participants and one of the organizers.

In preparation for the GA, the Forum aimed to cultivate a bottom-up approach to collectively craft an 'audacious African astronomy vision'. The link to a carefully structured Google Doc was shared with the participants, all of whom were encouraged to engage with and take ownership of this vision. Among other things, this document contained sections on 'people'. 'infrastructure', 'science' and 'funding'. It also included a section on 'legacy', reflecting the goal not only of hosting the GA 'on African soil', but also of generating a long-lasting effect for people in Africa, astronomers and the general population alike. While Kevin Govender, Director of the OAD and one of the main organizers, gave a detailed introduction to the then 25-page document and explained its various points, a large number of comments and suggestions began to appear in the document. Like probably many others, I kept the meeting's window in the background while following the activities in Google Doc. Many participants were embracing the opportunity to shape this vision collectively, to mark and annotate, to bring up new points and reply to other participants' comments. Over the following two days, these comments were collectively incorporated into the growing document, an actualization of the 'principle of shared ownership' posited in the document's prologue.

Rather than bemoaning the challenges of doing astronomy in Africa, this emergent document became an exercise in conceiving of a near future in which astrophysics in and from Africa will become vibrant and be globally recognized. It also sought to produce both a feasible road map for reaching this near future in 2024 and a 'legacy' effect thereafter. The Forum both celebrated the scientific achievements achieved on African soil by African people and also took the universality of astrophysics for granted. On the one hand, it was generally assumed that contributions could be made to astrophysics regardless of location, and that scientists from across the globe could gather in a single conference venue to discuss state-of-the-art research and develop

common questions. On the other hand, the Forum emphasized the particularity of Africa as a place where astrophysical research is conducted but requires more attention. Far from being indifferent to place, the Forum suggested that science's universality depends on a plurality of places, definitely including African ones. Such thinking, the Forum's organizers recognized, tongue in cheek, is audacious; it is daring and it might meet resistance. Yet, they chose to meet the challenges head on. Embracing science as a geographically and socially situated practice, the Forum shows, is a strategic way to cultivate the universality of astrophysics as a scientific discipline. The Forum's strong emphasis on how special and unique this occasion is for 'Africa' speaks to the inequalities of doing science on this planet in postcolonial conditions that hinder equal possibilities of participation. Nevertheless, the Forum asserted that African astronomers are equipped to become important players in the universal discipline of astrophysics. The multitude of astronomy initiatives that were mentioned in the Forum on both the professional and amateur levels proved this point, but the Forum also made it clear that Africa had not yet fulfilled its potential. Not yet, but acting towards this horizon with a collectively written document provided a collectively drawn road map and set a timer: until the GA2024.

Benja did not take part in the Forum, though his conception of astronomy as providing a way to connect with people across the globe resonates with the Forum's conception of astrophysics as a scientific discipline whose universality allows African scientists to work towards equal participation on a global stage. In both cases, an ideal of science's universality provides direction for emplaced activities. And in both cases, a sense of remoteness and an acute awareness of being particularly situated make whatever promises to transcend particularity attractive. In this article, I first trace this attraction to universality. I then discuss the philosopher Paulin Hountondji's notion of universality in relationship to the concept of a horizon. Finally, I explore this metaphor to understand the drafting of the Forum's vision document and feed it into astronomy's geometry of connectivity, which I take from Benja. In this article, I argue that the horizon, as a figure to think with, allows us to describe the condition of being situated without abandoning the idea of a whole, of a maximally large picture, of the universe in which everything is contained, which is something that astrophysicists care for. As a horizon, universality does not demand opposition to particularity or relativism, but foregrounds target-oriented aspirations that never lose touch with actors' concrete situatedness on earth. I next provide some background on astronomy in Africa.

Fig. 1 African Astronomy Map. Created by the Outreach Committee of the African Astronomical Society (AfAS), included with kind permission from AfAS.

Universality's Attraction

In the past decade or two, astronomy activities have multiplied on the African continent. While a few countries have a long history of astronomy, and while African sites are among the earliest locations from which astronomical observations were made (such as Nabta Playa in today's Egypt [Malville 2015]), most other countries are relative newcomers to what we understand as astrophysics and space science today (Pović et al. 2018; Baratoux 2021). Emergent and vibrant, numerous Africa-based groups of amateur astronomers have formed in recent years to engage in astronomical activities, from public star-gazing events to educational initiatives for prison inmates. These groups interact with each other and are occasionally invited to present their work to the professional community of astrophysicists in Africa. While differences in language hinder closer-knit interactions, an overarching sense of contributing to the rise of astrophysics in Africa finds expression in the discourse of the African Astronomical Society (AfAS) and through events organized by the Office of Astronomy for Development (OAD). The Forum is one such event.

The OAD is jointly funded by the IAU and the South African National Research Foundation. One of its key tasks is to find ways in which astronomy can contribute to the UN's sustainable development goals. Assuming a globally shared fascination for the night sky, it helps to implement projects that connect astronomical knowledge with earth-bound needs, thereby seeking to counter the perception that astronomy is irrelevant to the problems on earth. The OAD is committed to the 'Principle of Universality of Science' as formulated by the International Council for Science in 2006.[1] This understanding of universality envisages the 'widest possible participation in science' because 'science is a common human endeavor that transcends national boundaries and is to be shared by all people'; it thus opposes 'any discrimination on the basis of such factors as ethnic origin, religion, citizenship, language, political stance, gender, sex or age' (2006:1).

Embracing its placement in Africa and thus speaking from and for Africa, the OAD profits from current trends in the discourse of global scientific policy-making bodies to pay attention to science and scientists in Africa. Indeed, on the second day of the Forum, one of the participants made a plea to the community of astronomers in Africa to engage more actively with these policy-making processes:

> Having listened to yesterday, I really feel that this […] focus on Africa at the GA in 2024 […] should be highlighted at the United Nations […] General Assembly next year. […] Just looking at yesterday, […] I didn't hear sufficient discussion around the enabling policy environment for all these good things to happen in the future. […] there is enormous benefit to be derived from [influencing future calls for scientific research that one can then apply to] and I feel the United Nations would be a very good area for which to do that and also to engage in the arena of science diplomacy.

Clearly, this participant understood the Forum's call to be audacious, but he was not making an entirely unrealistic suggestion. Given that the OAD regularly participates in policy-makers' events, this verbal contribution served as a reminder to think about the vision for astronomy in Africa on all available levels: supporting, coordinating and making visible grassroot initiatives; collaborating with higher education facilities; and networking with policy- and decision-makers. Science's claim to be universal, and thus to rely on participation from across the globe, opens the door to all of these levels.

In his own way, and on a much smaller scale, Benja is also interested in providing the conditions for future astronomy activities. He aspires to become influential enough for politicians to listen to him, and he has even thought about becoming a politician himself. In the meantime, he dedicates his time to nurturing the emerging astronomy community in Madagascar and to networking with scholars from abroad. In our con-

1 In 2018, the International Council for Science, ICSU, merged with the International Social Science Council, ISSC, to form the International Science Council, ISC. (This entailed a shift in vocabulary, and the principle mentioned here is now formulated as part of 'freedom and responsibility' of scientists with particular support for the 'advancement of science' in 'developing countries'.)

versation, he bemoaned the fact that these networks were not always seen favorably, especially if they included scholars from Europe. Benja told me:

> Africans are often quick to say that foreigners are colonizers. They do this often, but they do not take into account that science is universal, that we live on one planet. For example, here in Madagascar, it's a problem when people see French people who contribute to doing something [in science]. They will ask themselves whether there is an ulterior motive for neo-colonization or whether it's just a scientific collaboration. And that is a big problem for Africa. […] For me, [science] is universal, it has to be shared, everyone has to have access to it. It is an opening that we here in Africa should take advantage of. [We should] take advantage of this universality.

Embracing belonging to Africa, Benja felt the need to comment on the colonial lens through which Africa and European involvement in Africa is often portrayed. Science, he contended, is universal and as such an 'opening', a possibility through which Africans and Europeans can collaborate, the ability to meet one another at eye-level. Because it is universal, science should not be left to Europeans alone, as 'everyone has to have access to it', irrespective of whether they are in Europe or in Africa or anywhere else on the globe. Culminating in the call for Africans to take advantage of science's universality, Benja's statement evolved from his unease about the discourse on (de-) colonization's relation to science and showed their discursive proximity.

Decolonization is a thriving topic in the social sciences and humanities. Calls to 'decolonize the mind' (wa Thiong'o 1986), efforts to achieve 'epistemic decolonization' (Ndlovu-Gatsheni 2018) and initiatives to 'decolonize higher education' (Woldegiorgis 2021; see also Katundo 2020) engage with colonial history in order to rethink and reconfigure the assumptions and practices that underpin knowledge production. The notion that knowledge is always 'situated' is central (Haraway 1988). Although popular and productive within the social sciences and humanities, 'decolonization' strikes an uneasy chord with natural scientists because it seems to threaten the very foundations of science itself. Open to questions of social inclusion, the geographical spread of opportunities to learn and do science and the effects of linguistic conventions for the scholarly discourse, natural scientists are less willing to entertain critiques or relativization of the principles of Enlightenment rationality on which their disciplines are based.

In 2015, at the University of Cape Town, a social science student spoke passionately about the need to decolonize the natural sciences too, because 'science as a whole is a product of Western modernity, and the whole thing should be scratched off'.[2]

2 At the University of Cape Town in 2015, successful protests for the removal of a statue of Cecil Rhodes, a visionary of the colonialist project in southern Africa, turned into a larger movement in South Africa and beyond that addressed various historically grown and persistent structures of discrimination. This included protests against university fees (fees must fall) and demands to reconsider higher education curricula. The protesters came to be known as 'fallists'. One small event that took place in this context thematized the decolonization of the epistemologies of natural sciences. The video clip containing the

Captured on a YouTube video, the student's plea produced a wave of negative, often insulting comments that expressed vehement resistance, even aggressive antagonism to any challenge to the universality of science. While the vast majority of astronomers do not engage with the term 'decolonization' or reject it altogether, Tana Joseph takes a different approach. She is a South African astronomer who has moved from astrophysics to doing science communication and consultancy for audiences in Africa and Europe. She engages with the feminist and black discourse on astronomy that is mainly propagated in the USA (see Prescod-Weinstein 2021) and with literature on structural inequalities in the natural sciences (for example, Cech and Waidzunas 2021) to introduce these topics to more astronomers and advocate more equity and inclusion in astronomy (Joseph 2021; 2022a; Joseph 2022b). Joseph remains committed to the universality of science, but uses the language of 'decolonization' to point out that science is not universally accessible because of colonialism. Other initiatives that are narrated as part of decolonization work include Sibusiso Biyela's efforts to translate astronomical vocabulary into African languages, such as isiZulu (Kwon 2019) and Wanga Zembe-Mkabile's voicing of post-apartheid traces of racialization (Nordling 2018). Mostly, however, these topics are not dealt with in relation to the struggle against the colonial heritage, and certainly not using the language of 'decolonization', which has the potential to radically fragment science and alienate scientists. Rather, they are dealt with as questions of inclusion and participation, which are much less contentious and have even received a platform in one major journal, *Nature Astronomy* (see for example McBride et al. 2018).

'Astronomers are not like social scientists', I was told by an astronomer, Modest, in an interdisciplinary workshop:

> Astronomers do not look for the points of difference, not for an astronomy that is particularly African and thus different, but they look for the points of agreement – and that is found in science, its numbers, its calculations, its conclusions. The only problem is that not everybody can participate in learning and doing this science.

Like many other African astronomers I talked to, Modest turned conversations about decolonization into a critique of the structural inequalities of participation, effectively foregrounding the appeal of science's universality, which Benja had highlighted as an 'opening' that 'we here in Africa should take advantage of'.

Universality is attractive. It does not offer itself to discourses that challenge the very foundations of the science, but it does allow one to address inequalities of participation. While a discourse on decolonization could implicate unsettling the particular foundations of contemporary science, the affirmation of science's universality and the logical consequence that scientists' backgrounds should not matter can be employed as a

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quote in question stemmed from this event. In the reactions to this video, the hashtag #sciencemustfall was used to ridicule the speaker. See the video and comments here: https://www.youtube.com/watch?v=-C9SiRNibD14, accessed March 8, 2024.

gateway to African astronomers' participation in international science diplomacy and as leverage to criticize and counter stubborn conditions of inequality. Science's universality is attractive because it supports political demands for more universal social structures in science.

Universality and Hountondji

In relation to social structures, scholarship in the social sciences has long described universality as ambiguous and incomplete. David Palumbo-Liu, for example, by asking 'what happens when the minor seeks to be part of the universal in the terms the universal claims for itself?' shows how difficult it is to challenge the universal from a standpoint that is not part of universality's framework and thereby challenges what universality stands for (1995:189). To be relegated to the realm of the 'particular', he contends, is to be 'situated beyond the bounds of the universal, or at its margins' (ibid.). The universal is defined as all-encompassing, yet in practice it is never accomplished. In practice it has margins, and these margins are contested. At the Forum, the astronomers perceived themselves to be located at the margins and sought to counteract the implications that come with this positioning. They did so not by downplaying the particularity of their situatedness in Africa, but by embracing this placement and stressing the importance of contributing to the endeavor of astrophysics from Africa. The ideal of a universal astrophysics is incomplete without contributions from Africa, a notion that recalls Paulin Hountondji's philosophical engagement.

Trained as a philosopher in France in the 1960s, Paulin Hountondji was the first philosophy professor in what is now known as Benin. Time and place mandated him to reconfigure philosophy for and in the period when African countries received their independence, for which he rejected 'ethnophilosophy' as too particularistic (Hountondji 1996, first published in French in 1976). Against the grain of attempts to appropriate scientific disciplines for the African context, he feared that African thinkers doing 'ethnophilosophy' would confine their significance to that very context. Instead, in his writings Hountondji advocates embracing philosophy as a human endeavor. Relying on Habermas's argument that reason is established within intersubjective communication (see also Ali 2006), Hountondji notes that 'a debate is only possible if in the game of giving and asking for reasons, the interlocutors both look towards the same horizon and raise the same claim to truth'[3] (ibid. 2017:161). He encourages African philosophers to enter communication with other philosophers and take part in philosophical discourse, because 'the requirement for veracity and universality are things

3 Here and hereafter, the translation of Hountondji's 2017 text is adopted from Graham Wetherall, published online: https://bpb-us-e1.wpmucdn.com/sites.northwestern.edu/dist/d/5576/files/2021/06/Constructing-the-Universal-1.pdf, accessed March 11, 2024.

which cross cultural boundaries. The requirement for universality is itself universal' (ibid. 2017:161; see also Lamola 2021).

Universality, we can learn from Hountondji, is

> everywhere seen as a value, a norm which must govern our discursive practices. The fact that this norm remains an asymptotic ideal which is never attained is not sufficient to invalidate it. On the contrary, this failure presents us with a very precise task: to […] tirelessly pursue this ideal, recognizing at each turn the limits of all knowledge held to be universal; and to identify why, how, and in what way it is necessary to correct it. (ibid. 2017:161)

By taking universality not as a given quality of Western thought, Hountondji demonstrates that the achievement of universality is incomplete and will always remain incomplete (see also Nyamnjoh 2017): it cannot be contained in neat dichotomies such as here/there, local/global, modern/traditional. Having moved from Paris to Dahomey and configuring philosophy for a particular postcolonial context, Hountondji's philosophy defends the value of universality not in spite of regional differences, but because of them. Universality is an anchor in the global condition that saves us from fragmentation into innumerous particulars. Universality may be and remain incomplete, but there is value in striving towards it.

Hountondji stresses that philosophy's striving for universality does not mean it should seek to disconnect itself from the places and times from which thought emerges. On the contrary: for him, participating in philosophical debate and giving direction to African philosophy need to arise from and speak to the 'present historical situation of Africa' (ibid. 1996:66). Philosophy, and science more generally,[4] are done in places, and relate to these places; and it is from the plurality of places that philosophical contributions need to accumulate to build a more universal understanding of the world. In Dübgen and Skupien's words, Hountondji argues for the 'internal pluralities of each society, each following the aspirational goal of universal validity […] which will serve as a regulative ideal' (ibid. 2019:151). Put differently, universality is an ideal to invest in, or, in his own words, an 'infinite horizon of a communal task which all the cultures of the world must work towards' (Hountondji 2017:156).

Horizon as Analytical Lens

Read through Hountondji, the Forum on astronomy in Africa was doing work on universality by asserting an African position for a more 'universal' study of the universe from earth. It was asserting astronomy in Africa as simultaneously different because it

4 Hountondji speaks of philosophy as science, building on the French demarcation of 'science'.

is placed in Africa, and not different because it is looking 'towards the same horizon' of astrophysics' scientific discourse. Hountondji employs 'horizon' as an aspirational goal that can be shared and that needs to be shared if a peaceful discourse is to work towards determining the universal validity of truth-claims. Inspired by Hountondji, I take up this metaphor of a horizon to explore how the Forum crafted its 'audacious' vision and to examine this notion in relationship to the geometry that Benja puts forth, in which the notion of a horizon designates a limit to the view of both earth and sky. I assert that Hountondji's delineation of universality requiring a shared 'horizon', read together with astrophysics, opens fruitful perspectives on universality as a source of hope in an unequal world.

The GA in 'Africa': Sharing a Horizon for Astrophysical Research

The Forum met after the decision had been announced that the IAU-GA would take place in Cape Town in 2024. In South Africa, the scientific discipline of astronomy has a history that spans some 200 years and is entangled with colonialism and apartheid (Dubow 2018). Taking ownership of an existing prestige project, the post-apartheid government invested in astrophysics as one of the few select flagship disciplines, which, at the expense of others, were to promote 'world-class "curiosity-driven research"' and secure South Africa's position on the global map of cutting-edge science (Beinart and Dubow 2021:322). However, the Forum's discourse does not emphasize that the GA is taking place in South Africa; rather, it foregrounds 'Africa' as a whole. 'Africa' here is an epistemic object to which the participants of the Forum owned and attributed a lived reality (see below). It was also a geographical region that gave weight to Cape Town in standing out amongst the competing potential host locations for the GA. No other competitor could claim to represent an entire continent. And because it is being hosted for the first time in 'Africa', it is hoped that the GA will provide visibility to the vibrancy of astronomical activities across the continent and provide opportunities to integrate African astronomers more closely into the structures of global astrophysics.

The parallels with Hountondji's vision for African philosophers to take part in the philosophical discourse are noteworthy. Taking over Hountondji's vocabulary, one may say that in both cases the 'shared horizon', which is a condition for the processes of intersubjectively working towards universal validity of what is considered 'truth' or 'fact', was determined by the common discipline that people were trained in. The more people from diverse backgrounds contribute to the 'infinite horizon of [this] communal task' (Hountondji 2017:155), the more the scientific result will reflect universal validity. The decision of the Forum's organizers to portray the GA in Cape Town as an event in and for 'Africa' reflected an aspiration towards universality. If the narrative of the conference were to focus on 'South Africa', it would affirm a 'centre' from which the scientific discourse is shaped and would work towards bringing South Africa closer to this centre, moving away from all the places that continue to be marked as 'peripheral' to science. In contrast, a conference that is understood to take place in 'Africa' and for

which a Forum is organized so that astronomers from across the continent may take ownership of it appears to transcend the logic of centre and periphery. The investment in bringing the GA to 'Africa' and Hountondji's call for African philosophers to contribute to the philosophical discourse are both geared to putting the 'shared horizon' into practice. But the Forum also shows awareness that this is not easily accomplished.

Audacity: Horizoning Amidst Local Conditions

Preparing for the GA, the Forum worked collectively towards formulating a vision it describes as 'audacious'. The word 'audacious' enables a double move. First, it *acknowledges* that astronomers might feel uncomfortable with thinking big about science in 'Africa'. For the participants of the Forum, 'Africa' stood for the place-related conditions in which they found themselves and that they shared. There are economic, political, historical and social reasons, it was understood, why 'Africa' is not associated with cutting-edge science. The word 'audacious' also alludes to astronomers' self-conscious justification of astrophysical research in places that are discursively portrayed as overflowing with other, more urgent problems. We recognize how audacious it is, the subtext suggests, to advocate gazing into outer space when the conditions on earth are so dire. The word 'audacious' thus does not assume a South African privilege from which astrophysical research is supported politically. Instead, it seeks to include astronomers in other parts of Africa. The second main effect of 'audacious' is to *encourage* thinking and acting big, despite everyday challenges. It encourages the boldness to take astrophysics' claim to universality at face value, creating a vision of an African astrophysics that is able to collaborate and compete on the global stage. The participants in the meeting in which the vision document was worked on embraced the multiple connotation of such 'audaciousness'.

The organizers' deliberate preparation of an 'audacious' vision acknowledged that the universality of astrophysics had not yet been achieved, while deploying the ideal of science's universality to insist on inclusion. Turning 'horizon' into a verb, 'horizoning', Adriana Petryna has devised a 'wayfinding tool that plumbs the lines of a durable world' (ibid. 2022:152) for 'thinking about and responding to complex futures' (ibid. 2022:5). In the face of ecological disaster, she argues, horizoning is directed against an inclination to succumb to despair; it is directed at engagement 'in a mode of thinking that considers ecological disasters against a horizon of expectation in which [we are] still able to act' (ibid. 2022:150). Although deployed in the context of unequal global structures of participation in science rather than the ecological crisis, the Forum's invitation to partake in the crafting of an 'audacious' vision, I suggest, was also performing horizoning work. It took seriously but pushed back against the idea that Africa was not equipped to host cutting-edge astrophysical research. Instead, it focused on finding a path through local conditions that were perceived as obstacles to global participation in science, thereby contributing to the ideal of astrophysics' universality. By foregrounding and assembling the various astronomy activities that were already flour-

ishing, the Forum counted on the multiplicity of participants to do horizoning work collectively and envisage an ambitious, even audacious but attainable goal for 2024 and beyond. Although the Forum included formulations about having a 'legacy' effect and tried to prepare for what comes after 2024, it is inherent in the very notion of a horizon that one cannot see beyond it. As one learns from Petryna's discussion of 'horizoning', one needs to prepare for the unpredictable. Still, the Forum provided a platform for a collective delineation of a horizon. By carefully planning, supporting and monitoring activities leading up to the GA in 2024, it worked against despair by presenting various goals as achievable.

Of course, Petryna's 'horizoning' as the management of overwhelming ecological conditions is different from Hountondji's 'shared horizon' as a necessary condition for intersubjective work towards the universal validity of truth-claims. Yet, both speak to the Forum's overarching narrative of translating science's claim to universality into universal participation in science. While Hountondji aims to find a 'middle way' between 'universalism' and 'relativism', the Forum worked with and went beyond this duality. It showed that part of its 'horizoning' work involved turning science's 'universality' into a 'shared horizon'. Here, a literal understanding of 'horizon' becomes important.

Benja's Geometry: Overcoming the Limitations of Terrestrial Horizons

On the canvas of our visual perception, the horizon demarcates the limits of our vision. Depending on context, the horizon wiggles over houses, trees, or mountains. At sea, the horizon appears more or less as a straight line. Because the earth is spherical and non-transparent, our gaze can never reach beyond the horizon – we can only see that part of the earth on which we are situated. As we move, the horizon moves. Just close enough, it attracts our attention to whatever is beyond our visual perceptibility (see also Yoshimi 2016 on Husserl's 'horizon theory'). Considering planetary forces, earth's atmosphere, the weather and climatic conditions, the possibilities of perceiving one's horizon – as a clear line, blurred, or not at all – are influenced by the accumulation of activities of other people and more than human assemblages around the globe.

In one of our many conversations, Benja said that, before learning about astronomy, he had a sense of being situated in remoteness. From Madagascar, even if you go to its coastal shores, the next landmass is beyond the horizon. For Madagascar, the coastal horizon doubles as the state boundary. Despite the myriad connections forged across the Indian Ocean (Desai 2010; Sheriff and Engseng 2014), Madagascar's distance from 'the world' gave Benja a sense of disconnectedness. 'Technology helps a little', he said. But technology alone does not warrant meaningful connectivity; it helps, but does not provide. What really made the difference for Benja was finding 'a common point', a term that in this case can be taken quite literally.

Instead of searching for 'common points' on earth and allowing the horizon to restrict the realm of visual perception for phenomena on earth, Benja has discovered that astronomy 'can be a common point' that triangulates connectivity. Indeed, astronomy

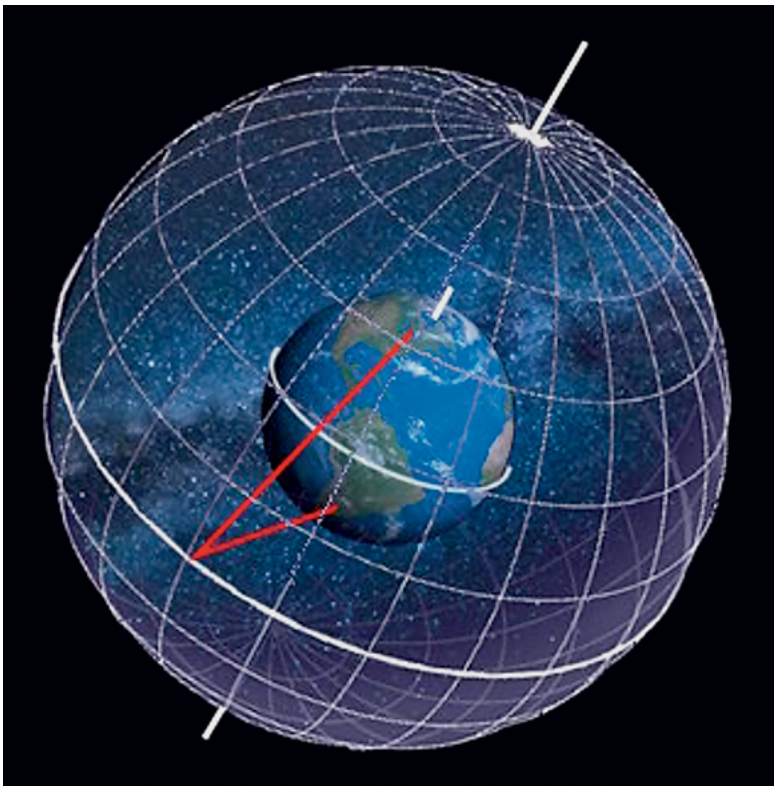

Fig. 2 Enveloping the earth, the night sky as seen from earth can be portrayed as another sphere. A light source in the night sky may act as a 'common point' that connects people at different locations on earth who cannot see each other (red lines connecting places on earth to a point in the night sky). Image by Pablo Carlos Budassi, Creative Commons Attribution-Share Alike 4.0 International license. Red lines added by author.

draws attention away from earth and thereby provides myriad points that may attract one's gaze: when it is dark (and not light-polluted or overcast), stars and galaxies appear as observable points of light. Any one point of light can be seen by people who on earth may be physically quite distant from each other. Benja takes the example of himself, in Madagascar, speaking to a person in France. In his example, the moon is visible to both, and so is Orion, because Orion is placed at the celestial equator. However, the Pole Star, placed almost directly above the North Pole, can only be seen from France in the northern hemisphere, not from Madagascar. While not all points of light in the night sky may act as a 'common point', they broaden the physical geometry for people to connect beyond 'the line where earth seems to meet the sky'.

Instead of lamenting the inability to see the earth beyond the horizon, Benja's geometry exploits the possibilities the horizon opens up. Situated on earth, we are able to

direct our gaze above the horizon and thus – via 'common points' on the celestial sphere and conversations about these common points with the help of technology – surpass limiting boundaries. In Benja's words, then 'there are no longer any state boundaries'. From the particularity of concrete terrestrial places, this geometry may not be able to connect all people around the globe. It may not provide universality, but it allows for *more* universality than a perspective on earth-bound events may suggest.

Universality is an ideal that remains forever incomplete. Even the study of the universe encounters and posits various horizons: the event horizon that marks the boundary beyond which events in outer space cannot reach the observer; or the cosmological horizon, which is the result of a calculation that marks the distance from which one could possibly retrieve information (the edge of the universe). Like terrestrial horizons, these horizons centre the position from where observations are done. For astrophysics, horizons are useful, a type of resource. They help us to appreciate the ongoing situatedness of observations and knowledge and to find methods to engage with them. This is also true for astronomy's more immediate 'celestial' horizon.

From any position on earth, we can only see the portion of the sky that the horizon permits. We cannot observe that part of the sky that stretches out below us. Put differently, the earth – that which is familiar to us – blocks a universal view into outer space. However, astrophysical research is interested in studying the universe in its totality, for which it has at least two strategies. One is to place telescopes in outer space, such as the Hubble or the James Webb Space Telescope. The other, and that will be of interest here, is to place telescopes in different locations on earth and network them.

Benja also touches on this in our conversation, linking networks of telescopes with networks of people:

> Astronomy is a cooperation. Without this cooperation, we couldn't do anything, since we would only have a single vision. But with others we will have many other visions; that is the principle of interferometry. To cover a grander surface, a better resolution, to see a bit more clearly, it takes many people of these [different] regions, many telescopes. We can also say, to have a grand vision of the world, we need many people.

This resonates with scholarship in the social sciences: whatever is familiar influences the perception of phenomena and possibly obscures them; from any one single viewpoint, knowledge is always partial and situated (Haraway 1988). But perhaps this limitation can be overcome not by universalizing a single gaze, but by multiplying numerous emplaced ones. As Benja says, 'To have a grand vision of the world, we need many people'. The perspective of each person may be limited by the celestial horizon, but in collaboration, these perspectives can come together and create something that approaches universality.

Benja translates astronomy's need to place telescopes around the globe as an opportunity for 'Africa'. 'This is an opening that we, here in Africa, must take advantage of', he says. In a separate conversation, Mamy, a physics student and friend of Benja's, also

addressed this relationship between scientific discipline and place, though she reverses the argument to foreground Madagascar's value for astronomy: 'Madagascar can contribute to the evolution of astronomy in the world'. Like the Forum's self-conscious affirmation of being situated in 'Africa' as an asset for astronomy, and like Hountondji's decidedly 'African' contribution to philosophy, Benja and Mamy's arguments blend the universality of science with the situatedness of scientists.

Conclusion

Benja, an amateur astronomer in Madagascar who mitigated his sense of remoteness by finding a connective 'common point' in the stars, and the participants at the Forum, astronomers in Africa who set out to collaborate in crafting a vision for their discipline, are keenly aware of their particular positionings within the unequal geopolitical structures of earth. Nevertheless, they care about universality as an attribute of science in general and astronomy in particular. Astronomy and its claim to universality, they show, does not contradict their experiences of marginality. Rather, astronomy can be utilized from their particular positions to act towards universality. Employing science's claim to universality as leverage, without this as yet applying to the conditions for participating in science, astronomers in Africa turn their position into an asset through which steps towards universality (both of science and of participation in science) may be taken. This resonates with the work of Paulin Hountondji, who advocates working towards the universality of science as an ideal that requires contributions from differently placed actors. Inspired by his work, I have read his notion of 'horizon' against its more literal meaning of astronomical observations. While horizons mark spatio-temporal aspirations and conditions of manageability, they are also implicated in geometries of global connectivity. As a figure to think with, horizons attend to concretely placed observations without disregarding an ideal of wholeness. They characterize an optics in which the earth meets outer space. In the case of astronomy in Africa, universality – read as a horizon – emerges as a method to tame the unfamiliar and provide orientations towards a future characterized by more inclusion, more participation, and in effect, better science.

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