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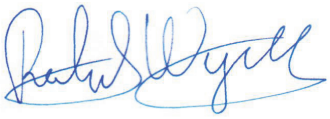
To whom it may concern

Reflections on 5 years of ASPIRE

Dear Reader,

This document contains a brief description of the history of ASPIRE and reflects on its goals and what evidence we can find in its participants and their stories that the programme is meeting those goals.

Sincerely,



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The First Five Years of ASPIRE

Astrophysics Summer Programme for International Research Experience

1 Origin and history of ASPIRE

The idea to organise a summer research school for ambitious international students at API came from Dr. Jayne Birkby in 2018, when she was a junior staff member; it was inspired, a.o., by her participation in the Leiden LEAPS programme. It was supported by the MT and first run in 2019. When Dr. Birkby left for Oxford in 2020, the programme was taken over by prof. Wijers and somewhat modified in objective and target group. The pandemic caused the programme to be cancelled in 2020, and to be held online in 2021 and 2022. Starting summer 2023, we do the programme in person again in Amsterdam.

2 Goals and target groups of the ASPIRE programme

The primary goal of the ASPIRE programme is to offer talented students in astronomy the opportunity to come into contact with, and do, frontline astronomy research, targeting students who do not have access to that naturally in their place of study. Specifically, we want to help them with an experience that will increase their chances of being admitted to an MSc or PhD programme in a strong astronomy research institution. For this reason, we target students that are already enrolled in an MSc programme at the time of application and are not yet in a PhD programme. And we do not target students that are already enrolled in an institution with a strong international MSc and PhD programme in astronomy or physics. The boundary between these is not sharp, of course, and other factors in the life of students play a role in the decision of whether they qualify. But typically, our selected students come from the global south and BRICS countries, with some countries with a mix of university levels having some institutions that qualify and others not. This approach was motivated in particular by our own PhD recruitment process: API always bundles all available PhD positions in joint recruitment process, where we get about 300 applicants each year, for 5–10 PhD positions. We find consistently that about 10–20% of the applicants come from fairly unknown places, with levels of preparation that are very hard to judge, and recommendations that are similarly hard to judge. And yet, a good fraction of those seem potentially quite talented, but they

lose out in the very tough competition to candidates who are better prepared and easier for us to calibrate. We therefore felt that targeting this group for ASPIRE would be very effective, because their participation adds experience and CV items to their record that improve their chances of admission to competitive research programmes.

Another goal of the ASPIRE programme is to offer our PhD candidates and postdocs the opportunity to gain experience in diversity efforts, candidate selection from a pool of applicants, and supervision of junior researchers. These are all skills that add value to their CV and therefore also help their chances in future career steps. The API faculty will sometimes also advise ASPIRE students, but they will preferably act as mentor for an early career researcher (ECR) who is learning supervision skills through ASPIRE.

API as a whole has set itself as a target to strive for equity and inclusion in astronomy, and has chosen a few focus areas for this effort, to optimise the impact of available staff time. ASPIRE has been chosen as one of those focus areas.

3 The ASPIRE alumni

3.1 Countries of origin

Thus far, ASPIRE has hosted 39 students from 20 countries, almost all from South America, Africa, and Asia. In fig. 1 we show the countries of origin.

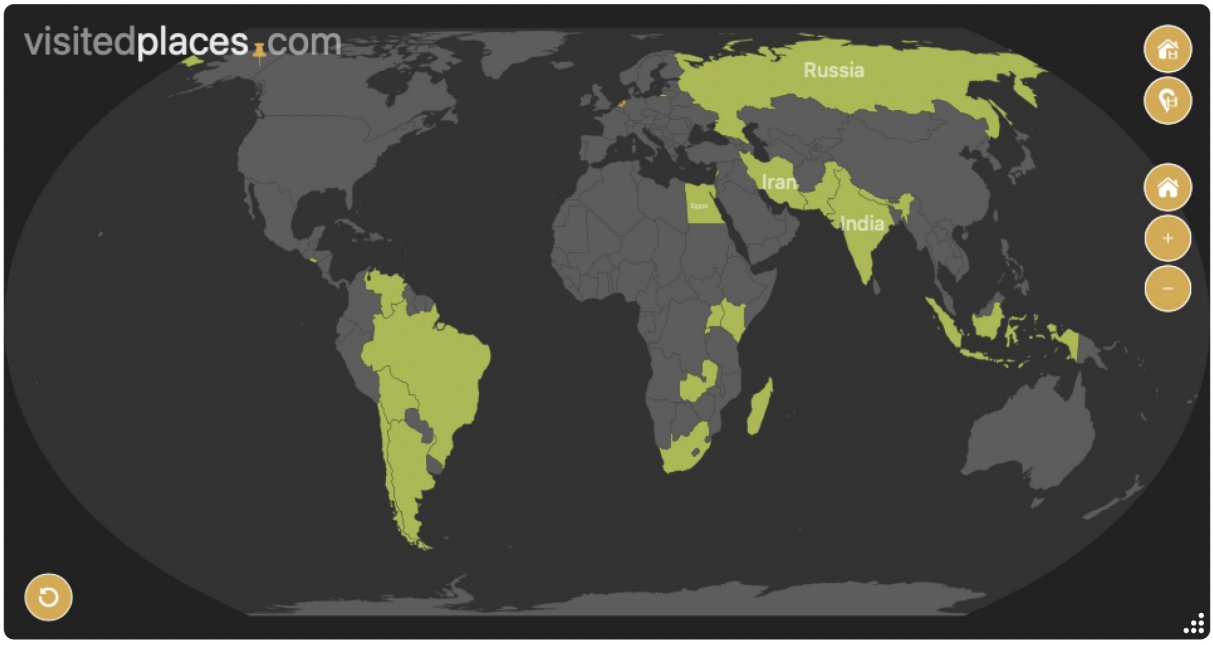

Figure 1: The countries of origin of the participants in the first five years of ASPIRE, 2019-2024.

Table 1: Participants in ASPIRE by year and continent of origin.

year	N	countries
2019	8	Argentina, Bolivia, Brazil, El Salvador, Kenya, Pakistan, Venezuela, Zambia
2021 (online)	11	India (2), Indonesia, Iran, Lebanon, Madagascar, Pakistan, Russia, South Africa (2), Uganda
2022 (online)	7	India (4), Indonesia, Rwanda, South Africa
2023	6	Egypt, India (2), Madagascar, Pakistan, Russia
2024	7	Chile, India, Iran, Kenya, Nepal, Pakistan, South Africa
continent		
South/Central America	6	Argentina, Bolivia, Brazil, Chile, El Salvador, Venezuela
Africa	12	Egypt, Kenya (2), Madagascar (2), Rwanda, South Africa (4), Uganda, Zambia
Asia	19	India (9), Indonesia (2), Iran (2), Lebanon, Nepal, Pakistan (4)
Europe	2	Russia (2)

We also list an overview of the participation by country from year to year, and by continent over the five-year period in tab. 1.

It should be noted that even in the in-person years, we have had a total of 4 students participating online because we do not want to exclude students a priori for their likelihood of getting a visa; these 4 students were those whose visa applications failed, and we allowed them to participate anyway, online.

3.2 Representation

We select students purely on their motivation and talent, and on the extent to which they lack access to world-leading research in their current country and university. We also consider their position within their country in terms of their opportunities. We do not select on ability to pay, and therefore fully fund all the students we accept.

It is our anecdotal impression that, not surprisingly, we get more students who are relatively wealthy within their own country. This is no doubt a result of the fact that we require them to be in an MSc programme, and access to higher education has an economic bias everywhere (including the Netherlands). We do check our selection at each step for bias. First we determine which students are eligible. This selection tends to be regionally biased, because students from wealthy industrialised nations almost always already have the same access to strong research research groups that ASPIRE can offer. Then we select a longlist of about 1/3 of the remaining students, and from that a shortlist for (online) interview, and after interview we make the final selection. At each stage of down-select we check whether the selection step left us with a group that is representative of the eligible applicant pool. Generally, this is the case, and we sometimes adjust the selection a bit if we feel that did not go well enough. Of course, the selected candidates are a small enough group that small-number fluctuations will always affect the statistics.

Overall, we can say that there are two ways in which the alumni are not representative of the pool of eligible applicants. First, the applicant pool is in majority male (about 55%), but the selected students are 2/3 female (27 out of 39). This is due to the fact that we bias for students who are underrepresented within their own community, and in most countries (again including our own) astronomy is fairly male-dominated. We also have overrepresentation of minorities in other ways in our alumni pool, but prefer not to share details, both for reasons of privacy and because known minority membership is not always without risk for our alumni. There is also somewhat of a regional/country bias. There are a few countries that are very populous, and/or have a very well-oiled system for stimulating their students to apply for opportunities like ASPIRE. We want to offer opportunities to all, so we tend to weigh against that a little bit. India, for example, has about 40% of the eligible applicants, but 23% of the alumni. There are also some smaller countries that are a bit overrepresented, which seems to be caused primarily by the fact that our programme is advertised by word of mouth and so successful applicants tend to stimulate more applications from their country in later years.

4 Does ASPIRE achieve its goals?

We have defined a number of goals for ASPIRE (sec. 2), namely (1) to increase inclusion and diversity in astronomy, (2) to improve the chances of talented students from disadvantaged backgrounds to start a research career in astronomy, and (3) to offer our own ECRs the opportunity to develop some key skills for their future career and strengthen their CV. We will discuss these in turn.

4.1 Inclusion and diversity

It is clear from the previous section (3) that we are increasing the diversity of the astronomy population significantly. Our alumni have been offered an opportunity to interact with front-line astronomy that is very scarce in their own country, and is only accessible to them by enrolling in an MSc or PhD programme elsewhere. However, their chances of getting accepted are slim. These chances are increased significantly by participating in ASPIRE or similar programmes (see below).

Whether we are also improving inclusion is less trivial to measure, since this refers to whether the students feel welcome, accepted, and valued in our programme. We do not conduct systematic surveys of this after the end of the programme, but we do of course get a lot of anecdotal feedback. First of all, the blogs of the students who create one tend to be very positive about their experience. Also, many students continue voluntary involvement with the research group in which they worked at API, and some even continue their research. This does indicate a level of mutual positive appreciation between the student and advisor and their group, so we do feel we achieve at least a level of inclusion. We remain in occasional touch with about 2/3 of our alumni.

Table 2: Outcomes in terms of further education and career of ASPIRE alumni

year	partic.	PhD	MSc	non-res.	unknown/ applying
2019	8	6	1	1	0
2021	11	8	0	3	0
2022	7	5	0	2	0
2023	6	1	2	0	3
2024	7	0	0	0	7

4.2 Improve the chances of talent

Quite a few of our alumni do indeed apply to MSc and PhD programmes in strong research universities. They are supported by us in that effort by having the ASPIRE project on their CV, and sometimes even a published paper from that effort; also, their API advisor(s) write recommendation letters in support of their applications. The results to date are summarized in tab. 2 and we can say that they are truly above expectation. Via continuing contacts and internet searches we were able to trace all the alumni, without exception.

We see that it typically takes 1–2 years after ASPIRE for them to end up in a research MSc or PhD programme, so we regard the numbers for the first three years as final. For those years, we that 19 out of 26 end up in a PhD programme, and one in a research-oriented MSc. This means that an astonishing 77% of the ASPIRE alumni end up in advanced research education, which we claim as the key thing we can help our participants with. As we know from our own experience, this number would likely be close to zero if they had not participated in ASPIRE or a similar programme. And to be very clear: we do not claim to have added the majority of the knowledge, experience, and talent they have to their CV. Mostly we have made their talents and skills more visible and calibrated to the admissions proces of those programmes by our support.

ASPIRE is too young to have any idea whether those who do a PhD will also continue in research thereafter. Very likely a significant fraction will not, as is the case with PhDs worldwide in all fields, because we train PhDs not just for academia, but also to contribute their knowledge and skills to other complex aspects of problem-solving in society. We also note from our research that most alumni who did not go on to a PhD programme are doing inspiring jobs in education or technology.

Thus far, we have 5 known cases of the ASPIRE student actually becoming first author or co-author of a published journal paper related to their ASPIRE project. The duration of our programme is too short to get to that point, so these papers are always the result of collaboration that continued until well after the end of their participation in the programme.

4.3 Skill development of our early-career researchers

It is not unusual for our PhD candidates and postdocs (early-career researchers – ECRs) to help with the research supervision of our own MSc and BSc students. However, advising an ASPIRE student still adds to this experience because it will often be the first time time that they supervise a project that they designed themselves. Also, the background of the ASPIRE students is quite different from our own students, who are almost exclusively educated in our own university or universities of similar level and also in majority of similar cultural identity. So in advising an ASPIRE student, they also learn about setting up a productive working relationship with someone with a very different background and cultural identity.

Furthermore, the ECRs participate fully in the selection of the participants from the long list of applications. This teaches them about what to watch for when scouting for talent. It also teaches them about the biases that come naturally with any selection process. We discuss this in our preparation, and we monitor bias during the selection process, so they get equipped at least to some extent with tools to be aware of bias and handle its consequences.

We regularly get enthusiastic feedback from our ECRs about their role in ASPIRE, and sometimes updates about the alumni they advised and are still in touch with.

5 The future of ASPIRE

Given all the above, we conclude that the overall impact of ASPIRE is quite significant, in the ways we hoped it would be. We therefore hope to be able to continue the programme. There are three factors we need to manage continually in order to do so.

First, money is a limiting factor. The expenses of about € 5000 per student are quite significant, and given the current financial situation in academia we will have to continue a strong fundraising effort in order to be able to organise ASPIRE.

Second, availability of advisors is a limiting factor. While the enthusiasm about ASPIRE is fairly strong, and API has declared it a priority, the students are available only in summer, which is therefore the time during which their advisors must be here. However, summer is of course also prime time for vacation (and for many staff the only possible time), and it is also high season for staff and ECRs to travel to summer schools and conferences, or to collaborators in major projects. We can manage this in part by having a participant being adopted by a group, which can more easily ensure that there is always an advisor available, and by keeping the motivation and enthusiasm for the programme high among our ever-changing population of ECRs.

Third, we have to manage the visa application process for the students quite well. The international political situation can be precarious, and we are sometimes confronted with rather unexpected visa rejections. The best antidotes we have found sofar are to start the process in a timely manner, offer the applicants significant help with their visa application, and address the Dutch embassies or consulates in the countries of origin timely and individually from our side as well.

In short, we feel that continuing ASPIRE is important and rewarding, if not always easy.