

# Per aspera ad astra simul: ERASMUS+ strategic partnerships for international education and outreach.

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## Abstract

Most researchers and educators are familiar with the Erasmus+ programme of the European Commission through its support for spending a semester or two abroad during an undergraduate degree programme. However, the programme also provides funding for other activities including multinational strategic partnerships between research and educational institutions. Here, we outline the details of two such strategic partnerships, demonstrating that they can prove to be an incredibly valuable resource for supporting and promoting educational projects as well as furthering the development of early career researchers.

## 1 Introduction

When most people think of the European Commission's Erasmus+ programme, they think of semesters abroad during undergraduate degrees. However, this is only part of what is supported by the programme. Key Action 2 of the Erasmus+ programme includes financial support for multinational strategic partnerships to carry out projects in line with the programmes aims: the promotion of educational, professional and personal development. Such strategic partnerships are applied for on a national level by the lead institution in their home

country - in our case by the Astronomical Institute of the Academy of Sciences of the Czech Republic (AI ASCR). We have been fortunate enough to be two awarded consecutive projects – “Per Aspera Ad Astra Simul” (2017- 2020, 2017-1-CZ01-KA203-035562) and its (currently active) successor “European Collaborating Astronomers Project: España-Czechia-Slovakia” (2020-2023, 2020-1-CZ01-KA203-078200) – which we describe here with the hope of encouraging others to make use of these opportunities to fund educational and outreach projects might otherwise be difficult to undertake.

## 2 Partners

The complete list of partners involved in the two strategic partnerships is given in table 1. Charles University joined as a partner only for the second instance of the project, while GranTeCan was an Associate Partner for the first. AI ASCR was the lead institute of both projects, with key involvement in all activities from all partners. For example, all partners participated in mobilities and in local outreach and educational activities. Financially, the projects were managed by the lead institute with funds transferred to the partners in accordance with the planned activities.

Table 1: List of partner institutions

Institution	Country
Astronomical Institute of the Academy of Sciences of the Czech Republic (AI ASCR)	Cz
Instituto de Astrofísica de Canarias (IAC)	Es
Comenius University Bratislava	Sk
Masaryk University	Cz
Astronomical Institute of the Slovak Academy of Sciences (AI SAS)	Sk
Astronomical Institute of Charles University (AI CU)	Cz
GranTeCan (GTC)	Es

## 3 Mobilities

Erasmus+ strategic partnerships offer excellent financial support for mobilities of researchers for periods ranging from a few weeks to several months. As part of our strategic partnerships, we supported short term exchanges for senior researchers, in order to build and strengthen collaborations, and longer term exchanges for early career researchers, for their personal and professional development. To date, we have been able to support more than 30 mobilities (in spite of the COVID-19 pandemic striking towards the end of the first strategic partnership and adversely affecting travel).

Many of the mobilities have led to very tangible outcomes, like continued longterm collaboration and publications (see [1] for more details). One special example is the case of one long-term mobility of a Czech student to GranTeCan, where she combined her doctoral research with support astronomer activities. This offered the student a unique opportunity to gain experience in a world-leading observatory, something which has proved invaluable in her subsequent career as she has gone on to obtain highly competitive positions as both the European Space Agency and the European Southern Observatory following graduation.

## 4 Summer schools and educational resources

To date, the projects have supported the organisation of three summer schools targeting early career researchers. The first of these was organised in Tatranská Lomnica (Slovakia) in collaboration with OPTICON in 2019 [2]. “Observational astrophysics: from proposals to publication” comprised hands-on research projects for the attendees using archival data, as well as more traditional lectures on astronomical techniques and how to obtain observing time. The school was attended by approximately 40 students, with all local costs covered by the strategic partnership.

A second school, “GAIA and TESS: Tools for understanding the Local Universe” was held online (due to the COVID-19 pandemic) in 2022 with 17 students in attendance [4]. The school comprised a number of talks by experts on the TESS and Gaia missions (all of which were archived online and are available to the public), as well as detailed example research projects making use of the public data products of these missions.

“Eclipsing Binaries and Asteroseismology: Precise fundamental stellar parameters in the golden age of time-domain astronomy” was held in a hybrid format with 18 in-person attendees being hosted at the IAC’s offices on La Palma. The school featured a combination of practical tutorials using publicly available resources as well as more traditional lectures from both in-person and remote presenters.

A final school focusing on dynamics in the Universe is planned to be held in 2023 in Slovakia.

In addition to the summers schools, a brief workshop on échelle spectroscopy was organised for masters students from the Charles University and AI ASCR in September 2021. Furthermore, senior researchers from all institutes contributed to a book of review papers, each designed to provide a graduate-level introductions to their respective topics, ranging from stellar evolution through to the standard cosmological model [3].

## 5 Outreach

A key component of both strategic partnerships was outreach, with funding being used to support activities in schools and for the general public. Preschoolers in Ondřejov were invited to visit the observatory and tour the 2-m telescope there, before listening to a talk by one of the researchers of the AI ASCR. The children then created art projects based on what

they had seen and learned during the visit, with the results presented in a small gathering with their parents invited. In the Canary islands, a number of talks in local schools were organised catering to audiences ranging from six years old through to seventeen years old.

Talks for the general public were also presented in both the Czech and Slovak republics. Similarly, a YouTube channel was created hosting bilingual (English and Spanish) videos presenting basic astronomical concepts and interviews with astronomers<sup>1</sup>. Partners at the Comenius University also contributed to a pre-existing YouTube channel as part of the project<sup>2</sup>.

## 6 Conclusions

We have briefly outlined some of the activities undertaken as part of two strategic partnerships carried out under the auspices of the Key Action 2 of the Erasmus+ programme of the European Commission. Such strategic partnerships offer substantial financial support for educational and outreach activities and we strongly encourage other astronomy educators to consider how they too might make use of the scheme in future calls.

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## References

- [1] Jones, D., Kabáth, P., García-Rojas, J., et al., 2022, *Astronomy Education Journal*, 2, 1, 041resa
- [2] Kabáth, P., Korhonen, H., & Jones, D., 2019, *Contributions of the Astronomical Observatory Skalnaté Pleso*, 49, 522
- [3] Kabáth, P., Jones, D., & Skarka, M., 2020, *Reviews in Frontiers of Modern Astrophysics: From Space Debris to Cosmology*, Springer
- [4] Skarka, M., Janík, J., Paunzen, E., & Glos, V., 2021, *Contributions of the Astronomical Observatory Skalnaté Pleso*, 51, 41

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<sup>1</sup><https://www.youtube.com/channel/UCXBLE1tztL2mhY3Kb0ELieQ/videos>

<sup>2</sup><https://www.youtube.com/playlist?list=PLqiGU4u5LkCF2YYU450gss0PPhE-4j0fI>