Best Practice

# Your Night out under the Stars: Reaching beyond Native Audiences

**Francien Bossema**
*Leiden University, the Netherlands*
*francien.bossema@cwi.nl*

**João Retrê**
*Instituto de Astrofísica e Ciências do Espaço, Faculdade de Ciências, Universidade de Lisboa, Portugal*
*jretre@iastro.pt*

**Sérgio Pereira**
*Instituto de Astrofísica e Ciências do Espaço, Faculdade de Ciências, Universidade de Lisboa, Portugal*
*spereira@iastro.pt*

**Pedro Russo**
*Leiden University, the Netherlands*
*russo@strw.leidenuniv.nl*

**Keywords**
*Public engagement, public events, astronomy workshops*

To invite an international audience to engage with astronomy in Lisbon, we organised an outreach event with lectures, workshops and observations with telescopes. The event was held in the evening, was attended by 203 people and was aimed mainly at young adults visiting or living in Lisbon, as well as families. We aimed to give a large number of people of diverse nationalities the opportunity to interact with researchers and be inspired by astronomy, while enjoying a nice evening out. Lisbon is a trendy tourist destination, and we used this event to project a more international image of Instituto de Astrofísica e Ciências do Espaço (IA). This event was organised by IA in Lisbon, in collaboration with Leiden University (the Netherlands) and the Planetário Calouste Gulbenkian — Centro Ciência Viva (Lisbon). In this paper, we outline the methods chosen to achieve these goals, how they were implemented in practice and discuss the effect of the chosen methods. We also share suggestions for organisers of similar events in the future.

## Introduction

In recent years, Lisbon has become a trendy destination for tourists, international students, independent workers and entrepreneurs. Its culture and urban landscape have been the main attractions for non-native speakers. However, Lisbon has many research centres and science outreach institutions, which can take advantage of this new audience to promote the nation's achievements in science, and at the same time offer engaging and exciting content and experiences to those who do not understand Portuguese.

In this paper, we describe the process of designing an event titled *Your Night out under the Stars*: an evening with workshops, lectures and observations with telescopes to inspire people to learn about astronomy. This was the first large-scale outreach event organised by the Instituto de Astrofísica e Ciências do Espaço (IA) to be presented exclusively in English[1]. Through this project, we wanted expatriates, foreign students and tourists to engage with science and research and spark their interest in astronomy.

The Science Communication Group (SCG) of IA believes that the knowledge that astronomy generates is universal, and its mission is to share this knowledge with the wider public by inviting them to get involved and participate. IA has a very active collection of science communication initiatives, and its SCG has many years of experience in organising and participating in regular large-scale local and national astronomy events in Portuguese. Each event engages from a few hundred to a few thousand attendees. These events usually consist of lectures, observations of the night sky with telescopes and hands-on activities. In this context, we identified the need to address the potential audience of non-Portuguese people visiting or living in Lisbon and organised an event in English to attract this audience.

We had five core aims for the project:

Aim 1: Broaden the target audience of IA engagement to non-Portuguese speakers, in order to create a more international image of IA and promote its awareness among foreign students and visitors.

Aim 2: Create enthusiasm for astronomy among the intended audience.

Aim 3: Give the audience a unique experience, an evening out with science.

Aim 4: Improve public understanding of the Universe and of astronomy research.

Aim 5: Experiment with interactive workshops to see how the public and the researchers react.

Research by Buckley and Jensen (2014) on the motivations for people to attend science festivals shows that close contact and informal discussions with researchers work well to improve knowledge and understanding. Moreover, live events are apt to create an interest among the public. An inspiring and exciting atmosphere is often more important to the attendees than the actual content. Various types of activities, social interaction and close contact with scientists provide a unique experience and act as motivations to attend. In surveys on the motivations to attend astronomy events at the Institute of Astronomy, University of Cambridge, the importance

of learning new scientific content was highlighted, apart from the enthusiasm and accessibility to astronomers (Curtis, 2013). Another interesting initiative is Astronomy on Tap. These activities aim to enhance the interaction between scientists and the public through short presentations and discussions in an informal environment, like a bar (Rice & Levine, 2016). Combining these insights, inspirations and our main goals, we decided to develop our own event with hands-on activities, inspiring lectures and opportunities to interact with scientists. To gain further insight into designing such events, we contacted the organisers of similar events and conducted research on the target audience.

On Saturday 21 October 2017, the planned event was held at the Planetário Calouste Gulbenkian — Centro Ciência Viva, in Belém, Lisbon. This venue is a landmark in the city and hosts a monthly event (in Portuguese) organised by IA. Having our event at a location that is clearly linked to astronomy added to the inspiring and exciting atmosphere. More than 200 people attended the event, and their feedback about the evening was very positive.

## Research

To plan the project, we conducted desk research and studied the target audience with the help of case studies, statistics, interviews and an online survey.

## Case Studies

In Lisbon, we identified a science communication initiative in English, AR Respire connosco, organised by the Champalimaud Neuroscience Programme. The initiative covered a wide range of subjects, often connecting science with daily life. The organisers shared lessons learned from their experiences with us (Table 1).

To inform the design of an event best suited to attract and engage our non-Portuguese target audience, we conducted simple interviews with five organisers of evening events. These events were organised by museums and research institutes all over the world. These interviews focused on the motivation to organise such events and reasons for choosing the particular design, how well this design worked for their audience, ways of promotion and recommendations. Except for AR Respire connosco, these initiatives were held in the country's native language. A summary can be found in Table 1.

In total we spoke to five organisers from the United States, the Netherlands and Portugal. Most of the evening activities in the science museums we contacted were designed for adults and aimed to attract people who were not regular visitors. The concept was a fun night out with science, without a great focus on the scientific content. Activities included were freely roaming through a museum, science shows, hands-on activities, drinks and public talks. The organisers had arrived at these formats by learning from their experience and from trial and error when running this type of event.

The organisers offered important practical advice about the flow of people and how to distribute the audience over the activities and the space that is available at an event.

Promotion of their events was mainly done via social media (Facebook). Recommendations included giving each event a theme and modifying activities and drinks and food according to that theme. Another recommendation was to target the promotion at expats and international students, as they might spread the word so that for the following events, less promotion was needed. It was also recommended to include some students in the process of developing the event, so that they would feel connected.

## Statistics

Lisbon is a multicultural city, with a large population of non-Portuguese individuals living and working there. It also attracts large numbers of tourists. In 2015, there were 12 569 non-Portuguese residents in Lisbon from within the EU and 37 211 from non-EU countries. In October 2016, guests and tourists in Lisbon from outside Portugal totalled 316 574, mostly from Brazil, France, Germany, Spain and the United States[2]. This shows that there are many non-Portuguese visitors in Lisbon, strengthening the aim to target this group.

Reponses from a 2015 survey conducted by the City Hall of Lisbon showed that almost half were between 46 and 54 years old, whilst 23.8% were between 35 and 45, 15.9% were between 25 and 34. Most of the visitors came as a group of friends (42.8%). This was followed by couples (28.2%) and families (24.4%). In the survey, 57.3% of the respondents said they gathered information about Lisbon beforehand through friends and family, and 44.2% visited websites for accommodation. Only 5.7% used the Lisbon tourist office website[3]. From these figures, we concluded that most of our target audience consists of adults and young adults.

### Interviews with tourists in Belém, Lisbon

To get some inside information on the behaviour and interests of tourists, we approached groups of tourists on the streets in the area near the venue and conducted short interviews. Due to limited time and human resources, we were only able to interview sixteen groups of between two and eight people. The interviewees were of varied nationalities and ages, but primarily young people between 20–30 years old. As the setting was informal and people were approached in groups, most answers were given collectively.

We used the following questions as a guideline:

1. Where are you from?
2. With whom are you here?
3. Where and how do you find the activities you want to visit?
4. What do you think of science in Portugal, and particularly astronomy? Why?
5. Would you be interested in an astronomy night? (why?)
6. What kind of activities would you be most interested in?
    a. Lecture
    b. Hands-on workshop
    c. Observations with telescope
    d. Theatre show
    e. Concert
    f. Bar/drinks

The options given in question six were chosen based on the case studies and on IA's SCG portfolio, further limited by the human, material and financial resources available for a one-off event.

| Title | Naturalis After Dark | Adler After Dark | Science on the Rocks | Night Skies in the Observatory | Ar \| Respire Connosco |
|---|---|---|---|---|---|
| **Location** | Naturalis Biodiversity Center, Leiden, the Netherlands. | Adler planetarium, Chicago, USA. | Discovery Place, Charlotte, USA. | The Franklin Institute, Pennsylvania, USA. | Fundaçao Champalimaud, Lisbon, Portugal. |
| **Activities** | Late night show with a scientist as guest, open museum at night. | Open museum night, shows, hands-on activities, exhibits, drinks. | Free roaming in museum, extra activities. | Activities, telescopes, lecture. | Science-themed evening with speakers, hands-on activities, performance, round-table conversation, open bar. |
| **Target Audience** | 20- to 45-year-olds. | 20- to 40-year-olds. | 21-year-olds and above. | 21- to 45-year-olds. | All ages. |
| **Frequency** | Varied, approximately once a month. | Once a month. | Once a month. | Once a month. | Varied. |
| **Promotion** | Social media, newsletter, brainstorming with students. | Word of mouth, Facebook, newsletter. | Social media, flyers, radio advertisement, word of mouth. | Facebook, concierge association, public announcements on speakers, science-themed websites. | Closed Facebook groups, online cultural groups. |
| **Design motivation** | Competing against bars and Netflix — the event needs to be more attractive than that. Inspiration from a Dutch round-table television programme. | Need for events without children, trial and error: best of the museum combined with live entertainment and drinks. | Attract 21+, without children. Experience that millennials do not want a lecture, they want freedom of choice in activities. | Provide intelligent conversation and knowledge, as people do not interact with science on a daily basis. | Inspire people to talk about science, open bar induces people to stay and chat. |
| **Recommendations** | Use social media for promotion. | The venue and mood are more important than how much scientific content you can deliver. Include a variety of different types of activities, to interest the novice and the lay experts. | Target locals, international students and expats. They will generate publicity amongst friends. For tourists, you have to do all of the promotion every time as the audience is new with minimal word of mouth. Give the event a theme and build your activities around that. Have hands-on activities. | Make the activities inclusive. Creative activities work well. Talks should not be too long (maximum 20 minutes). Ask enthusiastic audience members to come and talk to the expert if they want to know more. Think about the flow of people, how are you going to guide them through the activities, how will they be distributed over your space. | Have a creative, interactive workshop. Talks should be 30 minutes maximum. Videos in a talk attract the audience. |

***Table 1.*** *Overview of similar initiatives.*

Most of the interviewed tourist groups were very interested in attending an astronomy event (81%). They said they found events by searching the internet and Facebook (63%), using the booking.com information app, accidentally stumbling up on the event or flyers at a bar (38%) or asking at their hotel (31%). No one had any knowledge about science in Portugal. They expected a lecture with explanations and recent insights in astronomy, watching the night sky, social events and a bar. They were most interested in a lecture about new discoveries, information about the history of astronomy and the building. The younger respondents were interested in the social aspect and the bar. Everyone was enthusiastic about observations through a telescope. The options of theatre or a concert were discarded by most as having nothing to do with the subject.

## Online Survey

To extend the target audience research, we used an online survey, using the same questions as those used for the in-person interviews. The target group for the survey was foreign nationals living in Lisbon. The survey was featured in ten Facebook groups for Lisbon expats, roommates, accommodation and international or Erasmus students. The total membership of these groups was approximately 10 000; however, it is likely that there were significant overlaps between the groups so the actual number of individuals exposed to the posts was likely to be much lower. We do not have access to the actual reach of the posts, but given the number of likes and the fact that we were a new member of these groups, the reach is probably low.

In total, 20 people filled in the survey within a week. Most of them were from Europe with 60% between 20 and 30 years old and 35% between 30 and 40. Sixteen out of the 20 respondents left their email address to receive more information and invitations to future events. 20% lived on their own in Lisbon, and 70% with a partner or with friends/flatmates.

The respondents reported using Facebook as their primary way of finding out about events in Lisbon (80%); second to this

was recommendations from friends and searching the internet. Again, they had very little knowledge about science and astronomy in Portugal. In an open question, they mentioned they would expect observations in a planetarium or with telescopes, discussions with scientists and a lecture on the history of astronomy. Afterwards, the options mentioned in question six were given. The most popular activity, under what they would like to see at an astronomy event (95%), was observations with telescopes, followed by a lecture on the latest discoveries in astronomy (65%) and hands-on workshops (60%). Half of the respondents reported that they would like to see a social aspect/bar. The information gathered through these surveys was used to create a list of possible activities.

## Event Concept and Design

The information gathered from the case studies and target audience research, via interviews and online survey, supported the development of the programme shown in Table 2. In summary, the popular choices were lectures about the history of astronomy or about the latest discoveries, observations of the night sky with telescopes, a planetarium show, hands-on workshops, conversations with scientists and a bar to socialise. In the final design of the event, we included all of these, with the exception of dedicated conversations with scientists and the bar. We had to rule them out because of space and regulation constraints at the venue.

In terms of venue, the event was organised at a landmark site for astronomy in Lisbon, the Planetário Calouste Gulbenkian — Centro Ciência Viva, which is an outreach partner of IA. The rich history of the Planetário, its central location and room dimensions (with a total capacity for 320 people), made it the perfect venue for this event.

By having workshops and lectures, or a light and sound show simultaneously, people could choose to engage in hands-on activities or just sit back, listen and relax. We decided to have two hands-on workshops and an activity in the dome of the planetarium at the same time as the workshop. The reason for not having more workshops was that there was not enough space at the venue. We decided to have a bigger activity simultaneously in the dome, so that all the people could engage in at least one activity at any given time. In this way, we also considered the flow of people, as was mentioned in the case studies. That is, there was always a spot for everyone in at least one activity.

The workshops were chosen by the IA's SCG on the basis of inputs from researchers and students of IA. After the activities were chosen, we contacted the researchers who were best suited to conduct these workshops. Every hands-on workshop could accommodate 16 people and the rest of the audience could attend the other activity in the dome. As a large part of the audience would perform the activity in the dome during both workshop rounds, we decided to have two different activities there and repeat the hands-on workshops in the second round.

| Time | Activity | Who |
|---|---|---|
| **20.30** | Doors open and registration for workshops. | |
| **21.00** | Workshop round 1.<br>A (very) brief history of astronomy (lecture).<br>Workshop: Build your own 3D Orion.<br>Workshop: The warped side of the Universe. | Alberto Negrão, researcher at IA.<br>João Luis, PhD student in Physics.<br>Francisco Lobo, researcher at IA. |
| **21.30** | Multiverse! Keynote lecture. | Andrew Liddle, Visiting Professor at IA. |
| **23.00** | Workshop round 2.<br>Light and sound show in the dome.<br>Workshop: Build your own 3D Orion.<br>Workshop: The warped side of the Universe. | João Luis, PhD student in Physics.<br>Francisco Lobo, researcher at IA. |
| **22.00–00.00** | Observations with telescopes. | |

***Table 2.*** *Programme of Your Night out under the Stars.*

The hands-on workshops, light and sound show and observations were designed in such a way that high proficiency in English was not necessary, thus making the evening more accessible. Almost all respondents in the pre-event research showed a keen interest in observations with telescopes. Luckily the weather on the day meant that everyone had the opportunity to observe and discuss observations with the volunteers.

One of the hands-on workshops, titled *The Warped Side of the Universe*, was conducted by IA researcher Francisco Lobo[4]. In this workshop, the bending of spacetime by matter is visualised with marbles on a lycra cloth that is spread across a circular frame (Figure 1).

The second hands-on workshop was titled *Build your own 3D Orion*[5]. In this workshop, João Luis, a PhD student in cosmology, demonstrated to the audience why we see the constellations as if the stars are all in the same plane in the sky, when in reality they are all at different distances from Earth. Using boards, sticks and foam balls to represent stars, the participants built a 3D model of the Orion constellation (Figure 2).

During the first round of the workshop, Alberto Negrão gave a short-lecture about the history of astronomy in the dome. During the second round, there was a light and sound show in the dome, consisting of projections of stars and constellations on the dome ceiling, accompanied by music. Andrew Liddle, a renowned British cosmologist who is currently living in Lisbon, agreed to give the keynote lecture. His talk about multiverse and the possibilities that our Universe is not unique was thirty minutes in length, and afterwards the public asked questions for a further twenty minutes, and the session closed with not enough of time for all the questions.

Outside, at the back of the planetarium, three telescopes gave the public the opportunity to see several stars and the planet Uranus (Figure 3).

Francien Bossema hosted the evening, giving short introductions to the speakers, explaining the project and programme and managing the questions for the speakers.

***Figure 1.*** *Workshop "The Warped Side of the Universe". Credit: B. Bento.*

***Figure 2.*** *Workshop "Build your own 3D Orion", people working on their project. Credit: B. Bento.*

***Figure 3.*** *Outside at the telescopes. Credit: B. Bento.*

## Logistics and Resources

In addition to the speakers, workshop facilitators and astronomers handling the telescopes, the event required technical support for talks, audience management inside and outside the planetarium dome, guiding registered participants to the corresponding hands-on workshops, collecting audience responses to the questionnaire at the entrance (given to every participant) and for the survey at the end of the event (optional), among other tasks.

To have a smoothly organised evening, with over 200 attendees, we needed a number of people to support us. We thus asked for volunteers from among the students of a science communication training programme managed by IA, named Viver Astronomia[6]. Applying the acquired skills in outreach events is part of this programme, and 18 students volunteered to assist at the event. Each of the volunteers was assigned a task (Table 3).

| Task | Number of People Needed |
|---|---|
| Scanning tickets at the door. | 3 |
| Asking questions from the questionnaire at the entrance. | 5 |
| Assisting at workshops. | 2 |
| Distributing workshop tickets. | 2 |
| Checking tickets at the door and guiding people to their seats. | 2 |
| Mounting and handling the telescopes. | 3 |
| Survey after the event. | 3 |
| Technical support. | 3 |
| Photographer. | 1 |

***Table 3.*** *Tasks and number of people needed. Note that some may have assisted with several tasks (for example the questionnaire before the event and the survey after were done by the same people).*

Members of the IA's SCG were also present to oversee the technical material and arrange the light and sound show. A video recording was taken of the keynote lecture in the dome[7].

The total material cost for the event was 40 euros, which was needed to buy materials for the workshops. The implicit costs of human resources were borne by IA members, planetarium staff and volunteers (18 people). The venue and associated costs were borne by Planetário Calouste Gulbenkian — Centro Ciência Viva. For these reasons, organising this event did not require specific funding beyond the normal running costs of the involved institutions.

## Promotion and Registration

After a brainstorming session about the keywords and main attractions for the public, we decided to call the evening "Your Night out under the Stars". This related to the unique experience of an evening out (night out), with astronomy (stars) and directly appealed to the reader (you), giving them a personalised experience and the freedom to choose their activities on the evening. Thus, it gave the reader and the potential audience a fairly good idea of what they could expect and sparked their interest at the same time.

In the promotion texts we used for the publication of the event, we tried to address the same key notions: an exciting evening out with science and friends, freedom in activities, a personalised feeling and of course astronomy. The venue Planetário Calouste Gulbenkian — Centro Ciência Viva, with one of the largest planetarium domes in Europe, was an attraction in itself. An example of a short text for, among others, cultural websites and Facebook groups is:

*Experience a night out with stars, planets and astronomers at one of the largest planetariums of Europe. The event will take place on Saturday 21 October starting 20.30 and is free! Registration in advance is required. Come with your friends and enjoy the workshops, lectures and observations with telescopes together. All activities will be in English.*

A flyer was designed (Figure 4). We chose this arc of the phases of the Moon for three reasons. Firstly, the Moon is very recognisable, immediately making the viewer think of astronomy and space. Secondly, the shape of the Moon resembles the dome of the planetarium, in which the event took place. Lastly, the words "Under the stars" are in this image placed under the crescent of the Moon. The placement of the text again highlights the important aspects of the title. The flyer was designed against a mainly white background for printing purposes.

In order to reach a wide audience, the event was promoted on several websites, in Facebook groups and via newsletters of embassies and institutions. An overview of promotion methods and which audiences they mainly targeted can be found in Table 4.

The event was published on the website of IA and the website of the planetarium as well as thirteen Facebook groups of (international) students in Lisbon and two Facebook groups for expats (total number of members exceeding 15 000, although members may not be unique and may be in many groups simultaneously). It was published online on the website of the tourist office[8]. The Erasmus office of the Science Faculty of the University of Lisbon sent an invitation for the event to all the current Erasmus students, and an invitation was also sent to the people who left their email address in the online survey of the target audience research. Several embassies were contacted: the British, American and Dutch embassies agreed to promote the event through newsletters and on their Facebook pages to reach their expat communities (Figure 5). Foundation Champalimaud added the event to the newsletter for their employees. A Facebook event was created on the Facebook page of IA, and publicity was also generated via IA's Twitter profile. The event's Facebook page had a total reach of 22 300. Another way of promoting, learned from the background research, was to leave flyers at hotels and guesthouses in the vicinity of the venue, asking them to notify their guests. Because our event sold out quickly, we did not try this route of promotion. For the same reason, we did not send a press-release to the local media contacts.


***Figure 4.*** *The digital flyer. Credit: Instituto de Astrofísica e Ciências do Espaço, John Colosimo (colosimophotography.com)/ESO.*

The registration was done via Eventbrite, which is a platform that can be used for selling tickets for an event and is free to use if the event is free[9]. Registration opened on Thursday, a week before the event. Within a day 90 tickets had been sold, and five days later, the event was sold out (320 tickets). When there were 100 people on the waiting list, we closed the waiting list. Because of IA SCG's experience that approximately 40% of the people holding a ticket do not show up at a free event, we asked for a confirmation of attendance four days before the event with the message that in the absence of confirmation, the registration would be cancelled. This method is used by IA for their other events and has considerably reduced no-show. The confirmation request led to 52 registrations being cancelled. Some people emailed afterwards to re-register, other tickets

| Promotion method | Target audience |
|---|---|
| Institutional websites. | General. |
| Universities (mailing lists). | International students. |
| Facebook.<br>Institutional/events.<br>International students/Erasmus groups.<br>Expat groups.<br>University groups.<br>Accommodation and flat-sharing groups. | General.<br>International students.<br>Expats.<br>Students in general.<br>New international students/expats |
| Cultural groups. | General. |
| Tourist websites. | Tourists. |
| Flyers at hotels/bars. | Tourists, students. |
| Invitation via international offices of the university. | International students. |
| Embassies. | Expats. |

***Table 4.*** *Overview of promotion methods and target audience.*

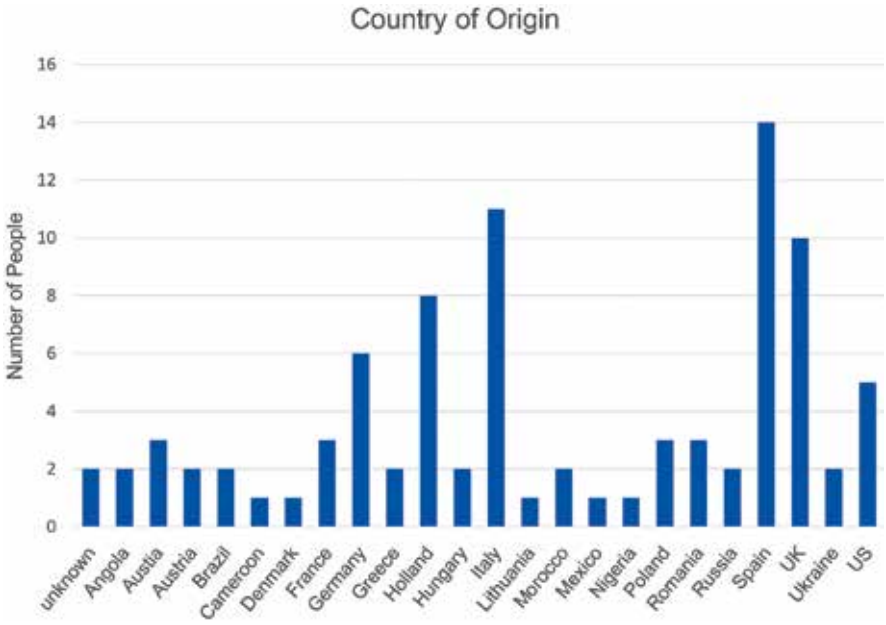


***Figure 5.*** *Summary of the nationalities of the attendees of* Your Night out under the Stars.

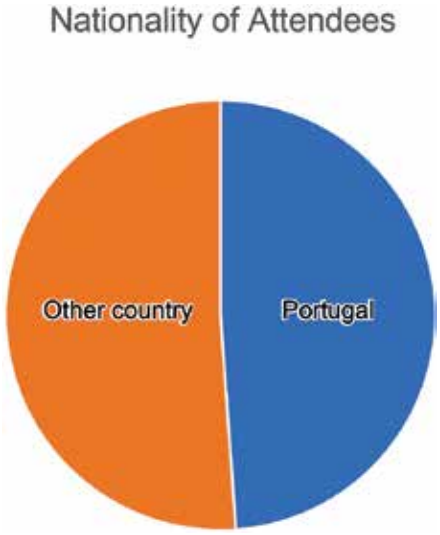


***Figure 6.*** *Country of origin of the audience (absolute numbers). Only 51.2% non-Portuguese attendees came to the event.*

were offered to the people on the waiting list. Eventually all the registration spots were not filled, and a total of 287 tickets were taken. On the night itself, the tickets were scanned using the Eventbrite organiser app..179 tickets were checked in, ten more tickets were distributed at the door and 14 guests of organisers and speakers attended, taking the total attendance to 203 people.

## Evaluation and Analysis

The evaluation of the event consisted of qualitative analysis — observation and speakers' feedback — and quantitative analysis, conducted using a pre-event questionnaire at the entrance and another optional questionnaire after the event. In the first questionnaire, each participant was interviewed by a volunteer, collecting basic demographic information and data on how people learnt about the event. The post-event questionnaire was optional and collected the audience's impression of the event itself and their opinion on several activities.

The timing of the activities overall suited the audience and there were a lot of questions following the keynote lecture. It would have been nice to have more room at the workshops, but the space did not allow for this. In total 15–30% of the audience went to one or both workshops. The workshops took place in the corridor — an unexpected result of this was that the workshops were very visible as part of the programme, and even those who did not participate were able to observe.

## Pre-event Questionnaire

In a questionnaire at the start of the event, volunteers asked the audience about their nationality, how they learnt about the event, whether they would have attended the event if the evening was in Portuguese and their sex. They asked 174 people, which is 85.7% of the audience. Of these 100 were women, 74 were men. In total 51.2% of the respondents were of foreign nationality (Figure 5). For the distribution of countries of origin, see Figure 6.

Of the people who answered the questionnaire, 67.6% said that they would have attended the event if it were held in Portuguese, 28.9% said they would not. After leaving out the Portuguese public, these figures are respectively 65.1% and 31.5%. If we run a similar event in the future, we may explore this in more detail by finding out if the non-Portuguese visitors also spoke, or could understand, Portuguese, or if this is because one did not need to

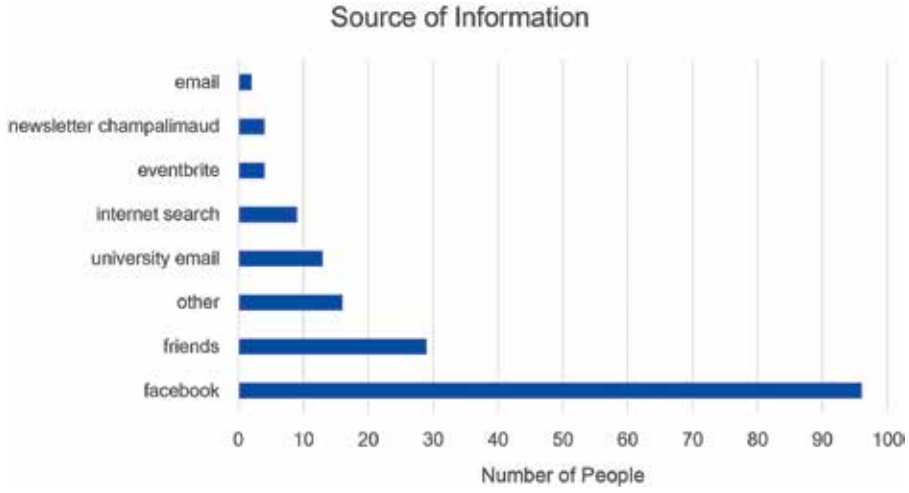


***Figure 7.*** *Sources of information about the event (absolute numbers).*

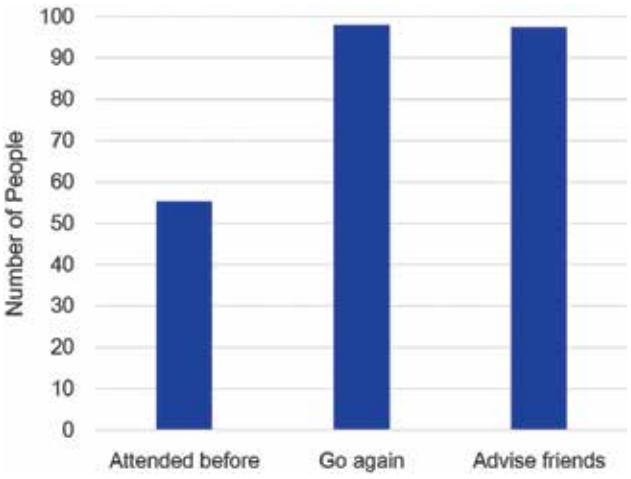


***Figure 8.*** *Percentage of attendees who answered "Yes" to the following questions: whether they had attended an astronomy event before (55.2%), whether they would want to go again (98%) and whether they would advise their friends to attend (97.3%).*

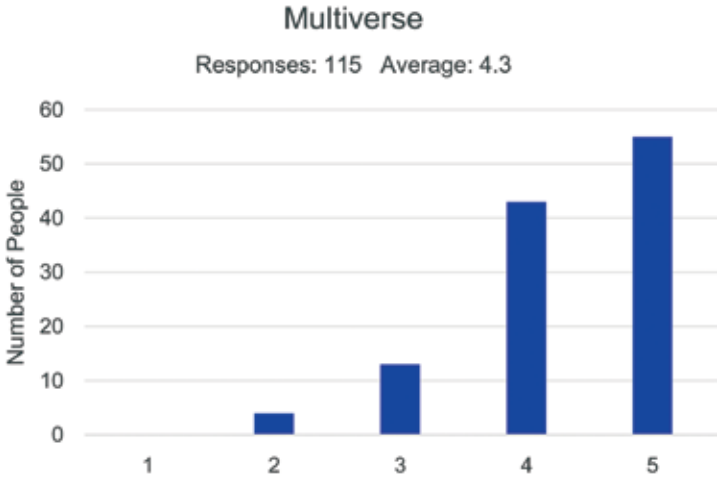


***Figure 9.*** *Grades from the survey for the keynote lecture.*

fully understand the spoken elements to enjoy the activities.

According to the survey, Facebook was the main source of information about this event. Word of mouth or invitation by friends was the second source. We also concluded that the email to Erasmus students (university email list) was effective. The distribution of the reported source of information about the event can be found in Figure 7.

## Post-event Questionnaire

An evaluation survey was conducted by asking the audience to fill in a post-event questionnaire about their experiences and opinions regarding the event. In total, 152 people filled in this questionnaire, which is 74.9% of the audience. This is a high response rate, and it may be influenced by the fact that we stressed the importance of filling out the questionnaire for research purposes, during the introduction of the event, and the volunteers actively asked the departing audience to fill in the questionnaire. We also made sure that the questionnaire was only one page, making it quick to fill out. The questionnaire consisted of three yes/no questions (previous attendance at an astronomy event, interest in future events and inclination to advise their friends to attend) and a rating scale of one to five for each of the activities, one being "did not like this activity at all" and five "I liked this activity very much".

People were asked to write their reasons for grading and any other remarks in an open comment section at the end of the survey. Because of the overlapping workshops, it was not possible to attend all activities, so people were asked to leave the answers blank if they did not attend the activity. However, 36 people rated all the activities, making it impossible to use their rating of the activities. Of those 36 surveys, only the yes/no questions have been used for analysis. The results of the yes/no questions are shown in Figure 8.

The best graded activity was "Build your own 3D Orion" workshop, and the lowest graded was the history lecture. See Table 5 for the average grades of each activity. The activities were mostly rated with 3's and 4's. See Figure 9 for the distribution of ratings for the keynote lecture.

| | |
|---|---|
| Workshop 1: Warped | 4.5 |
| Workshop 2: 3D Orion | 4.7 |
| Universities (Mailing lists) | 3.4 |
| Talk: History | 4.3 |
| Keynote: Multiverse | 4.5 |
| Light and sound show | 4.0 |
| Observations | 4.0 |

***Table 5.*** *Average grades for each activity.*

Note that different activities had a different number of respondents. The respondents were very positive about the event, and some of the remarks were as follows:

*Great event! Enjoyed the variety of talks, both on introduction level and also very deeply scientific. Good atmosphere and friendly people,*

*Hope this event can happen more often. Great job!*

*Thank you for reigniting my interest in Astronomy.*

## Conclusion

Given the fast sale of tickets and the positive reactions of the participants who filled in the surveys, we can infer that there is a high interest in English-language science-related outreach events in Lisbon. Holding an event in English opens up opportunities to involve a more international public. Moreover, we saw that a lot of Portuguese people attended the event as well, making it a great opportunity to mix national and international audiences. The event was successful, the design was well suited to our aims and IA intends to continue with similar activities in the near future. We summarise our recommendations for organisers of similar events and give a proposed timeline for the organisation of an event like *Your Night out Under the Stars* in Box 1 and Table 6.

**Box 1. Recommendations to other organisers**

- Think about the flow of people, how to use the space optimally.
- Make sure that everyone can do an activity at any time, meanwhile giving people some freedom in choosing their own activities.
- Hands-on activities are popular with the public and create close contact between researchers and the audience, which has a positive effect on the engagement of the public with science.
- Communicate the programme clearly (for example by printing the programme).
- Based on the case-studies research, a bar, drinks or food might enhance the conversation For inspiration see (Trotta, 2018).
- If your event is free, keep in mind that there might be a high rate of no-show. A way to lower no-shows is to ask people to confirm some days in advance.
- Promotion via Facebook, embassies and newsletters to international students were effective.
- Eventbrite is a useful platform. The people at the door scanning tickets need an account beforehand and a smartphone. Scanning tickets is easy and fast and the app gives real-time information about the number of people inside the venue. It is easier if people are only allowed to buy one ticket each, as this is the case for those on the waiting list.

| | |
|---|---|
| **At least two months before** | • Set a date.<br>• Find a venue.<br>• Approach a keynote speaker. |
| **A month before** | • Finish the programme (times and activities).<br>• Arrange researchers to give a workshop, discuss which workshops to give and the materials needed.<br>• Contact possible sponsors/promotion partners (universities, municipality, embassies).<br>• Design a flyer.<br>• Think about and, if applicable, arrange for broadcasting or recording. |
| **Three weeks before** | • Create a webpage with all the information.<br>• Make a list of social media sites to promote the event on.<br>• Produce promotional material.<br>• Send the website and other information to online cultural groups and the tourist office.<br>• Ask for volunteers for checking tickets, assisting at workshops, mounting telescopes, performing surveys, etc. and a photographer. |
| **Two weeks before** | • Open registrations.<br>• Publish event on several social media pages, send newsletters to contacts, create Facebook event.<br>• Arrange the logistics, technical requirements (microphone, slides, telescopes etc.), workshop materials. |
| **One week before** | • Contact speakers and volunteers to explain the logistics and programme of the evening and divide tasks (explain if you are using Eventbrite, people at the door will need the app).<br>• Deliver flyers at bars, tourist office, university etc.<br>• Prepare questionnaires/surveys for evaluation.<br>• Prepare tickets for the main event and the workshops.<br>• Think about the flow of people and the arrangements for the evening. |
| **The day itself** | • Print registrations list.<br>• Test the microphones, slides, technical equipment, etc.<br>• Instruct volunteers.<br>• Set up the workshop. |
| **Following** | • Evaluate, with the help of the surveys.<br>• Thank the volunteers and speakers.<br>• Put pictures and the recording of the event online. |

***Table 6.*** *Proposed timeline for similar events.*

More than half of the attendees were non-Portuguese, which means our first aim of broadening the target audience was met. On the evening itself, many people were enthusiastic, and the survey results confirm that enthusiasm for astronomy was generated among at least a section of the audience. Most of the participants were interested in attending follow-up events, implying they enjoyed their night out with astronomy. The many questions and interaction between the public and the researchers suggested that a step towards better understanding of the Universe and astronomy research had been taken by this audience. The hands-on workshops were successful in their aim to get people to interact with scientists and learn in an interactive way, and they were, for the most part, positively rated by the public. For future events, it would be interesting to investigate the degree of increased understanding at this kind of events.

The research conducted in advance was very useful for shaping our ideas and designing an event tailored to our aims. Of the data sources, the case-studies and speaking to other organisers of similar events gave us the most useful information. This was partly practical information, for example how to think about the flow of people and how to promote the event, and partly inspiration for inclusive activities. Given our previous research and the fact that both the case studies and target audience analysis highlighted the importance of drinks to enhance social interactions between scientists and audience as well as among the attendees themselves, it would be interesting to try out and study the effect of a bar at the event. We have summarised the main recommendations from the case studies and our own experience in Box 1.

We would advise people who plan on organising an outreach event to contact other organisers to learn from their experience. The evaluation research attached to this project could be extended. We chose to collect information on demographics and source of information at the start. We received a high response rate because of the direct way in which this information was sought. The response rate of the surveys after the event was higher than we expected. It would have been good to merge these two questionnaires, so that we could have linked the nationality data

to how the event was experienced and rated. Even though questionnaires after an event do not always achieve high response rates, we would advise future organisers to merge the two questionnaires into one for this reason.

In conclusion, the event was successful, and both researchers and the public enjoyed the interaction and the activities. It showed us that there is an audience for this type of event, which opens a door to a series of events to be held in the future.

## Acknowledgments

We would like to thank Andrew Liddle, Alberto Negrão, Francisco Lobo, João Luis, Beatriz Bento and the volunteers from the Viver Astronomia programme for their collaboration. Moreover, we would like to thank Olga Crapels, Kyle Sater, Charla Fields, Cat Aboudara, Anna Hobbiss and Catarina Ramos for their cooperation in speaking with us for the case studies. We would like to thank the tourists who assisted with the background research and the people who filled in the Facebook survey.

Francien Bossema received financial support for this project from the Leids Universiteits Fonds and the Erasmus+ programme of the European Union. João Retrê and Sérgio Pereira acknowledge financial support from the Science and Technology Foundation (FCT, Portugal) through research grants SFRH/BGCT/51617/2011 and IA2017-09-BGCT (JR), IA2015-07-BGCT (SP) and UID/FIS/04434/2013.

## Notes

1 Website, in English: divulgacao.iastro.pt/en/evento/your-night-out-under-the-stars-en/

2 Numbers obtained via email from the Lisbon City Hall

3 Survey of tourists' activities and information, 2016: www.visitlisboa.com/sites/default/files/2016-10/INQU%C3%89RITO%20%C3%80S%20ACTIVIDADES%20DOS%20TURISTAS%20E%20INFORMA%C3%87%C3%83O%202015_0.pdf

4 The workshop The Warped Side of the Universe, was based on the following Youtube video: www.youtube.com/watch?v=ZkURrrACG0g

5 The workshop Build Your Own 3D Orion was inspired by an article of the Astronomical Society of the Pacific that can be found here: astrosociety.org/edu/activities/F7_3D_Constellations.pdf

6 As part of the Viver Astronomia ("Living Astronomy") programme, students receive monthly training in mounting telescopes, in current scientific topics and in theoretical and practical aspects of science communication. They put into practice the acquired skills at outreach activities. More information online at divulgacao.iastro.pt/en/projeto/viver-astronomia-en/

7 Video of the keynote lecture: youtu.be/gnKhUFyPre8

8 Visit Lisbon website: www.visitlisboa.com/pt-pt/node/7619

9 Eventbrite: www.eventbrite.co.uk/e/your-night-out-under-the-stars-tickets-38588645678#

## References

Jensen, E. and N. Buckley, 'Why People Attend Science Festivals: Interests, Motivations and Self-Reported Benefits of Public Engagement with Research', Public Understanding of Science, vol. 23, no. 5, 2014, p. 557–573

Curtis, V., 'Evaluating the Motivations and Expectations of Those Attending a Public Astronomy Event', CAPjournal, no. 13, 2013, p. 14–18

Rice E. L. and B. W. Levine, 'Astronomy on Tap: Public Outreach Events in Bars', CAPjounal, no. 21, 2016, p. 13–19

Trotta, R., 'The Hands-On Universe: Making Sense of the Universe Using all your Senses', CAPjournal no. 23, 2018, p. 20–25

## Biographies

**Francien Bossema** Has a Msc In Mathematics, with a specialisation in Science Communication and Society at Leiden University (LU) in the Netherlands. She joined the Instituto de Astrofísica e Ciências do Espaço (IA) in Lisbon (Portugal) for a two-month internship in 2017 as part of her master's degree. She is currently PhD student at Centrum Wiskunde en Informatica (CWI) in Amsterdam.

**João Retrê** coordinates the activities of the Science Communication Group at IA. João is the creator and developer of several projects that aim to involve the academic community and the general public in active astronomy communication.

**Sérgio Pereira** is Science Communicator at IA, has a MSc in Science Communication and work experience in digital communication. He runs the Lisbon branch of PubhD.

**Pedro Russo** is Assistant Professor of Astronomy & Society at LU and also heads the Science & Society Group. Pedro is the President of the IAU Commission C2: Communicating Astronomy with the Public.