

Astronomy at the Airport: Supernova Science in the Southampton Airport Departure Lounge

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Over four consecutive days in February 2016 a group of astronomy researchers from the University of Southampton, UK, engaged a total of 1500 passengers waiting in the departure lounge at Southampton Airport with their astronomy research. This article reflects on the challenges and successes of the project which aimed to reach out to young families who would not normally attend science events, and show astronomers as positive role models.

Introduction

The idea to do astronomy outreach with airport passengers came about as a result of an outreach event on a plane above London during the March 2015 partial solar eclipse. During the eclipse a group of astronomers on the aeroplane gave out free eclipse glasses to fellow passengers so that they could view the event. We found that giving out a free gift to the passengers in such an unusual setting broke down a barrier and as a result the group became very open to learning about astronomy.

Based on this event we applied for and were awarded just over seven thousand pounds (GBP) of funding from the Science and Technology Facilities Council (STFC) Public Engagement fund to run an event in our local international airport, Southampton Airport. The main objectives of the event (called #AstroAirport on social media) were to raise awareness of the University's supernova research via a two-way conversation between astronomers and the public and to provide positive role models in science. We also wanted to attract new audiences who may not normally attend a science event.

Reaching audiences

For four consecutive days during the UK school holidays in February 2016 a group of four astronomy researchers from the University of Southampton engaged 1500 passengers waiting in the departure lounge with their world leading astronomy research. To start up a conversation with waiting passengers the researchers handed out free gifts such as towels with

a simplified image of a supernova printed on them. For us to count the interaction as an "engagement" we had to have a conversation with the passenger where we not only told them information, but they responded with questions and insights of their own. This is in line with the definition from the National Co-ordinating Centre for Public Engagement (NCCPE): where "Engagement is, by definition, a two-way process, involving interaction and listening, with the goal of generating mutual benefit"¹. Therefore, we did not count the engagement if we only gave the passenger a free goody bag and there was no discussion.

We expected the majority of passengers to be young families, as it was the school holidays; however, we estimate at least half of the engagements we had were with older people and airport staff.

Astronomers as role models

Another aim of the project was to provide positive scientist role models (both female and male) to challenge negative — or limiting — stereotypes. On each day there were four astronomy researchers explaining the research to passengers in the departure lounge. At least one researcher remained at the stand, which consisted of: a table filled with free gifts; hands-on demonstrations to explain core collapse supernovae; and a pop-up banner which had a greater level of detail about the research for the more interested public. The other astronomers would take goody bags (branded cloth bags filled with towels, leaflets and pens) and give them out to those passengers who were sitting at the gates ready to board. We

made sure that on each day there was at least one female astronomer.

"I never knew you could be a scientist for a job! I want to be a scientist now!" — eight-year-old girl engaged via the project.

Do gifts result in engagement?

We found that giving out a novel gift or goody bag was a great way to start up a conversation with members of the public. The gift itself is useful to allay fears the public may have that you are selling something. We found we had to explain that we were not there to recruit students or promote courses, and that we were simply there to promote the research itself and raise awareness of the world-leading research happening at the University. The conversations we had often started from a much more basic level than we were used to from science festivals where people are expecting to talk to scientists. However, even those people who began by saying they are not normally interested in science mentioned their excitement about the discovery of gravitational waves, which had happened in the previous week.

One member of the public commented that: *"the gifts were a good prompt to re-tell what I had been told."*

Several months after the event we received two emails which revealed the unexpected impact of the free towels and the accompanying leaflets. The first email was from a passenger who said about the image on the towel: *"To me it portrays in a modern/cubist point of view a portrayal of not just the supernova but also how humans can be*



Figure 1. The #AstroAirport design that was printed on the towel and other free gifts. Credit: Chris Frohmaier

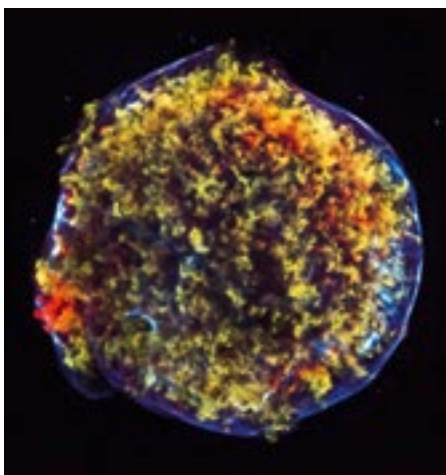


Figure 2. Tycho Supernova remnant. Credit: NASA/CXC/SAO

viewed — us in a collective but also separate; together and alone. An image that can be viewed at length, puzzling where we are and how we do (or don't) fit."

The second email was from a lady whose husband had suffered a stroke and his speech therapist had used the leaflet with him as part of his therapy: "Years ago he completed a degree in astrophysics and he is still familiar with all that he learned and it has always been a subject of great interest to him. We are using your leaflet as a reading and comprehension exercise, as sadly both have been affected by the stroke. We are both enjoying researching associated material and new information inspired by your leaflet. We thought you might like to know where one of your leaflets ended up and how it has been put to use!"

We ensured that the towel had a strong link to the research. The supernova that was printed on the towel was a colourful, simplified version of a real supernova Type Ia (the Tycho Supernova) and each of the 2200 towels was handed out alongside a leaflet which explained the image.



Figure 3. PhD student Chris Frohmaier explains to a young child how core collapse supernovae work using a Hoberman sphere. Credit: Robert Firth

The leaflet also had information on how supernovae are used as standard candles. We felt it was important that the gift itself was a reminder of the interaction, so that when people took it home and used it they would recall some science fact they had learned. At the airport, we used the colourful Hoberman spheres — toys made of spokes with intricate joints which can be expanded to a sphere and contracted to a core as seen in Figure 3 — to demonstrate the different stages of a core collapse supernova explosion.

As well as the towel, which was the main gift, we also had branded pens which were very popular with people of all ages, and we gave out branded colouring pencils and colouring sheets which also had an additional hashtag on them: #StressLessSupernova. The colouring sets were very popular with young children and with older members of the public who were visiting their grandchildren. We did try to promote the sets to lone adults as a mindfulness exercise, but with less success.

When long boarding queues formed at the gates in the lounge, two of us would walk up and down the queue talking to people



Figure 4. PhD student Juan Hernandez explains what we are doing in the departure lounge to some interested adult passengers. Credit: Robert Firth



Figure 5. Undergraduate Jo Barzycki showing how a Hoberman sphere can be used to explain supernova physics. Credit: Robert Firth

and offering them gifts in the #AstroAirport cloth bags. This was a good way to give potential reading material (in the form of the research leaflet) to people waiting to board, but most of the interactions in the boarding queues were not a two-way conversation so we did not count these in our number of engagements for the event.

The longest conversations that we had were with older people who approached our stand or with middle-aged people who were sitting waiting. In some cases we sat down next to them and had extended conversations after initially offering them the gift. Interestingly, some people who originally refused the free towel would then change their minds after hearing us talk enthusiastically about the science to the person sitting next to them.

Evaluation

Before carrying out any event evaluation one must always refer back to the original aims and objectives for the project. We made sure that for this project we had SMART (Specific, Measurable, Attainable, Relevant and Timely) objectives so that the success of the project could be easily quantified afterwards. We had three main foci for the event: to disseminate the supernova research; to promote the astronomy

researchers as role models; and to improve the passenger experience. Within the research dissemination aim we also had three main messages/learning objectives for the public:

1. Understand what a supernova is.
2. Understand that supernovae can be used to measure distance scales.
3. Learn how supernovae are used in research at the University of Southampton.

To measure whether the learning objectives had been met we asked the public to complete both a paper form on the day and an online form one month after the event. The public were incentivised to fill out the paper forms by being entered into a prize draw to win prizes like Lego® Research Academic sets and glow-in-the-dark planets. At the bottom of the paper form people were asked for an email address so that we could contact them one month later with a Google form to assess what they had done in the weeks that followed the event. We also noted down quotes from passengers we engaged with on each day.

Owing to the amount that the researchers had to do they were only able to get fifty-nine out of the 1500 people engaged to fill out the paper evaluation form, which is only 4%. The small numbers and the fact that a large number of those who filled in

the survey were people the researchers had had long conversations with, mean the evaluation data is likely to be heavily biased toward more positive opinions of the event. An external evaluator focused on getting audience responses via the survey would have been a useful addition to the project.

In the survey conducted on the day people were asked to list all the facts they had remembered from the interaction. What a supernova is, the life cycle of a star, elements released in the expansion and how hot a supernova is were mentioned twenty-seven times in the form whilst facts relating to using supernovae for research including for measuring distances and as standard candles were mentioned seven times. 100% of respondents correctly circled that a supernova is “an expanded star” and 92% said they had learned something about supernova research. Overall, we feel confident that the research was disseminated successfully and that the three main messages were successfully conveyed to the audience.

Originally, we had planned to have an electronic evaluation only, using three iPad minis at the airport and emailing a Google form out after the event. However, in general both the researchers and the public found it easier and quicker to use paper

forms. The three iPad minis were instead used to show the interested public several free stargazing apps that they could download for themselves. We used these to explain to people what the sky would look like on that evening, and on two occasions people went away from the stand and then came back with a friend and showed them the app themselves and described all they had learned. The iPads would have had more use if they had been attached to a separate stand so that people could do the quiz or use the apps in their own time, rather than being hosted by the researchers.

To assess what people remembered a month after the event they were sent a link to an online Google Form. Out of the fifty-nine who filled out the paper form thirty-six gave their email addresses and said they were happy to be contacted, but only nine responded to the online form. Eight of the respondents said that the interaction they had with the astronomers had improved their passenger experience. We received several emails from people after the event thanking us and requesting more free gifts. The two emails below also show that the event had a wider reach than just those passengers who saw us at the airport. The second email is particularly interesting as one of the original objectives was to promote science to female children through their parents and grandparents (see research from WISE² and SAGE³):

"Alf, my 7 year old, really enjoyed your event at Southampton Airport. It meant he had something interesting to do whilst waiting for our flight, thank you! Please if you have more towels could you send me some for Alf's friends?" — mother flying to Scotland.

"It was a delight to be able to talk about the supernova and space with my six-year-old granddaughter. I also heard her explaining to her two-year-old sister what the picture was on her flannel! An astronomer in the making!" — female grandparent who gave the free gifts to her family.

As part of the evaluation we also tracked hits to our dedicated supernova research website and tracked social media engagements.

Even though the free gifts (towels, pens, cloth bags, colouring-in sets) were printed with both the supernova research website⁴



Figure 6. The AstroAirport team. Credit: AstroAirport

and the event hashtag (#AstroAirport), only ten members of the public used the hashtag over the four days. The reason our hashtag was not used very much by the public was because the people coming through the airport during the half term tended to be either older people or young families so unlikely to be social media users. However, our research website did see a rise in visitors with 60% of website views being from new viewers, which translates to 81 new engagements. 100% of respondents to our online survey said they told someone about the interaction at the airport so we therefore feel confident that the event did reach our target of at least 2000 people. To incentivise the use of the hashtag online and filling out evaluation forms we held several competitions with prize draws. Members of the public who posted photos with the hashtag #AstroAirport to Twitter and Instagram were entered in a daily competition to win glow-in-the-dark planets. For completing the paper form they were entered into a prize draw to win a Lottie stargazer doll and Lego® Research Academics set. Finally, by completing the online form people could win tickets to Paulton's Park/Peppa Pig World, which is a local theme park for young children. All the prizes were chosen because of their appeal to our target audience — young families. This meant that older people, or people without young children in the family were not so inspired to

fill out the evaluation form. At future events we will have a wider range of prizes to cater for all age groups; for example, many teenagers liked our supernova staff t-shirts, or wanted to buy the Hoberman spheres from us, so we will offer these as prizes at future events.

Impact on the researchers

The event itself definitely improved the overall science communication skills of the researcher team:

"I felt I was there as a science promoter, not just a supernova expert. I had to step back from my usual approach at science events. A lot of the public were just interested in me personally or in more general subjects like how telescopes worked. They even asked probing questions like 'what is the point of your research?' I found these questions more interesting as they forced me think about the wider implications and economic impact of my research." — second-year PhD Student.

"My confidence in my physics knowledge has dramatically increased; when people asked me questions it made me realise how much I know about my research and physics in general. I also feel confident now that I can approach all types of people and talk to them with ease." — second-year

astronomy undergraduate who has now gone on to be employed in a public-facing PR role.

Challenges

Despite our event's being held only in an airport departure lounge, where security is a massive priority, we had very few challenges that stemmed from the location itself. The airport staff were all extremely supportive of our event, and we made an effort to include the airport ambassadors who were tasked with watching our activities each day. We were also lucky that Southampton Airport itself is so small and compact; this meant that we had access to all of the boarding gates from our location. Despite its being the school holidays during the Monday to Thursday period over which we ran the project, the Tuesday and Wednesday were particularly quiet. If we ran a similar event we would ask to work over the weekend, from Thursday to Sunday, when more people are likely to be travelling. We had originally planned to work over a weekend but unfortunately the airport did not have enough staff ambassadors to be able to supervise us on those days.

Despite sending out a press release via the University and via the airport media team, the only media coverage we got came in the form of a short entry in the News in Brief section of the local newspaper. The regional BBC News team contacted us on day two after they heard about the event through Twitter. The BBC News team had said they would send a cameraman and reporter to film the event on day three, but after receiving security clearance for departures they unfortunately got assigned to another story.

At the last minute we had the idea to link to the Hitchhiker's Guide to the Galaxy books and film series and had a quote from the books printed on the leaflet that went with the towel: "A towel is the most massively useful thing an interstellar traveller can have". We thought this quote tied in nicely with both our location — which was filled with travellers — and the towels we were giving out. However, we soon realised that very few of the audience at the airport during the school holidays knew of the series. We feel this link could have worked if we had planned our digital cam-

paign further in advance and had been able to contact celebrities from the film beforehand.

Conclusion and recommendations

When organising any public engagement event we recommend coming up with at least three SMART goals. From these goals you should work out the precise aims and overall impact of the project, then decide on the learning objectives for both the members of the public and the researchers delivering the activity.

Based on our main challenges we would recommend using an external evaluator to assess the project. If you are bidding for funds for an event expect to spend at least 10% on the evaluation of the project.

Plan a digital marketing campaign well in advance and use sponsored posts. For our activity in particular we should have spent more time and funds on the design of the complementing leaflet. We did not budget design costs into the grant and therefore did the design ourselves in a short period of time. Given another chance to design it we would put less text on the front page and we would have all the social media links on the front. On the back of the leaflet we would have a research-themed puzzle, to give the public something to do on the plane. This puzzle could also be incentivised by means of a prize for those people who email us the correct solution. Another nice idea, which works well for travellers, is to give them two printed postcards — one for them to send to their family from their holidays and the other one for them to send back to us to tell us what they have learned/remembered about the research.

Finally, by only having the one stand in the departure lounge we neglected a whole other audience who were on the other side of security, dropping off or picking up friends and family. If we did a similar event we would make sure to have a presence both before security and after. We suggest either an iPad stand next to a pop up banner or even something hands-on like a mechanical Hoberman sphere. Ideally the additional stand would also be staffed by at least one researcher. However, a flat screen showing some information would suffice. Having a stand before the security gates would have not only increased

our overall reach but would also have been likely to increase our media presence as it is much more accessible.

Notes

- ¹ NCCPE public engagement: <https://www.publicengagement.ac.uk/explore-it/what-public-engagement>
- ² WISE website: https://www.wisecampaign.org.uk/uploads/wise/files/not_for_people_like_me.pdf
- ³ SAGE website: <http://journals.sagepub.com/doi/abs/10.1177/0361684313482109>
- ⁴ Research website: <http://supernova.soton.ac.uk>

Biography

Sadie Jones is the Outreach Leader in Astronomy at the University of Southampton. She manages the Soton Astrodome mobile planetarium school visits with her team of PhD and Undergraduate students and presents talks and comedy sets on her own astrophysics research. She also organises large astronomy events such as the SETI Cipher Challenge, Stargazing Live evenings, and the Southampton Science and Engineering Festival.