

# Astronomy on Tap: Public Outreach Events in Bars

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Astronomy on Tap public outreach events are as easy to organise or as elaborate as you would like them to be. In addition to communicating cutting-edge research and fundamental concepts to the public, Astronomy on Tap events showcase the passion, creativity and diversity of scientists, facilitate personal and meaningful interactions between scientists and the general public, and offer networking and professional development opportunities for scientists. Astronomy on Tap organisers provide a growing cadre of resources for starting similar events, which have so far taken place in twenty locations around the world, mainly in the United States but also in Canada, Chile, and Taiwan, reaching a total of almost 15 000 people. Through this reflection on the Astronomy on Tap project we invite you to consider whether you could adopt aspects of the Astronomy on Tap model for existing outreach programmes, or even organise a new satellite event in your location.

## Introduction

Astronomy on Tap (AoT) is a network of free public outreach events featuring engaging science presentations in bars, often combined with music, games, and prizes for a fun, interactive atmosphere. The events are held in bars and other social venues in order to bring science directly to the adult public and to engage a broader adult audience than typical lectures held at academic and cultural institutions. Each event, typically held on a weekday evening, features several short astronomy-related presentations, primarily led by professional scientists but also by engineers, educators, writers, and artists. There is ample time for questions and conversations between presenters and the audience throughout the event with a dedicated question and answer session and/or panel discussion in every event. Organisers further encourage interactivity by offering small rewards for questions, playing games like trivia or bingo as part of the event, and awarding science-related books, DVDs and posters as prizes.

Over 150 AoT events were held between April 2013 and March 2016, including regular events in over a dozen locations and several singular events (see Table 1)<sup>1</sup>. Events continued at a rate of around ten per month. These have attracted extremely positive feedback from presenters, attendees, and venues, all without significant

funding. We provide organiser and presenter guides and other resources for new organisers, and our model of events is easy to customise based on the interests and resources of local organisers and their community.



**Figure 1.** The original Astronomy on Tap logo designed by Alex Parker (Southwest Research Institute) featuring the Hubble Ultra Deep Field (NASA, ESA, S. Beckwith [STScI] and the HUDF Team), based on an image created for the Pub Astronomy podcast by Renée Hlozek (University of Toronto) and Chris Lintott (University of Oxford). Many AoT “satellite” locations have designed their own logos based on the astronomy-image-in-a-glass concept.

## Background and goals

Adults in the United States who have finished formal schooling generally spend less than 5% of their lives in formal learning environments. Informal learning, however, can encompass a variety of experiences and tap into notions of lifelong, life-wide (across different social settings), and life-deep (exploring cultural and community values) learning, as detailed in the National Research Council’s Learning Science in the Informal Environment report (NRC 2009). The same report also identifies the best qualities of informal science learning, stating that it should be exciting and engaging, and should encourage sense-making and reflective practice, participation, and identity building.

Nearly three-quarters of American adults consider themselves lifelong learners, and a similar percentage are personal learners, in that they engage in activities to advance their knowledge based on personal interest. Over 80% of personal learners cite a physical location as the venue for that learning (Horrigan, 2016). Recent reports on the expanding nature of science engagement programming have pointed to the need not only for content, but for presenting it in engaging ways that reach wider audiences, both public and professional (Kaiser et al., 2014). Events should be flexible in terms of the physical spaces in which they run, and audience-centric,

connecting the audience and the scientific community in ways that are customised to their wants and needs (Durant et al., 2016). Along these lines, the primary goals of the AoT events are to:

1. Communicate cutting-edge research and fundamental concepts in science, including astrophysics, planetary science, Earth science, and other related fields, directly from scientists to the public in exciting and engaging live performances.
2. Convey the accessibility, relatability, creativity, diversity, and humanity of science and scientists to the public.
3. Provide opportunities for scientists to practise communication and presentation skills for non-technical audiences in a low-pressure atmosphere.
4. Enable networking among scientists, students, professionals in related fields, and members of their local communities.

The key to AoT is the relaxed, interactive environment. The motivation for having events at a bar or other social venue, instead of at an academic or cultural institution, is to bring science into the everyday life of the general public. In doing so, we aim to reach people who might be intimidated or discouraged by the traditional venues of science outreach. Events are structured to encourage interactions between scientists and the public via questions during and/or after the presentations and also the more extended conversations that are possible because of the open, social venue. We encourage questions from the audience by rewarding those who ask questions with token prizes, thereby explicitly emphasising that questions are fundamental to the pursuit of science and implicitly alleviating the pressure to “do well” — to ask the right questions, or to behave in the right manner — which can be a barrier to developing further interest in the subject matter (NRC, 2009; Hidi & Renninger, 2006). There are typically additional scientists in attendance other than the presenters, and they can be given the option of identifying themselves as available for questions and conversations with lanyards, wristbands, nametags, or even with a sticker that reads “Ask Me About \_\_\_\_\_!” filled in with their area of expertise. Both the scientists and the audience members appreciate opportunities to interact in smaller groups or one-on-one in addition to the presentations.



**Figure 2.** AoT “Uptown” (New York City) organisers Jeff Andrews (left) and Adrian Price-Whelan (centre) with Duane Lee (right), all Columbia University graduate students at the time, at an October 2013 event. Credit: Emily Rice

This type of informal environment has been shown to promote learning and is also evident in programmes such as Pint of Science, Café Scientifique, and Nerd Nite events. Key aspects of the format include the supportive, low-pressure nature of events, the audience members’ choice of learning in their leisure time, and personal relevance to the audience through encouraging and rewarding questions, pop culture references and more (Falk & Dierking, 2002). AoT events are similar to Nerd Nite events in that they typically feature multiple presentations along with games/trivia and prizes, but AoT is unique in its narrower focus on astronomy and related topics with the majority of presenters representing practising scientists from a range of institutions, career levels, and areas of expertise. Additionally, AoT blends aspects of science, art, performance, and comedy, tapping into what is recently being recognised as a cultural phenomenon (Kaiser et al., 2014).

The informal, entertaining nature of AoT leverages astronomy as a “gateway” science (Muñoz, 2013) to inspire public interest in, and appreciation of, scientific research. The presentations often include: foundational physics concepts like light and spectra, fundamental forces and particles, sound waves and seismology, and space-time curvature; research tools such as telescopes, colliders, spacecraft and computing; and results from research, both specific to the presenter and from other areas. As organisers, we encourage pre-

senters to use informal language and tone and to include pop culture references or add interactive elements, like demonstrations, whenever possible in order to make their presentations accessible and engaging to the general public. An emphasis on cutting-edge research in presentations can convey science as an ongoing and ever-evolving endeavour. While we don’t (yet) track audience outcomes, we evaluate the success of the events based on attendance, perceived audience engagement and participation, and feedback received in person and via social media. In particular, organisers have noticed positive reactions from non-expert audience members when a professional scientist admits they do not know the answer to a question, or that no one yet knows. Furthermore, organisers strive to showcase presenters from all genders, ethnic backgrounds, career levels, and types of institutions and they encourage presenters to include personal and creative aspects in their presentations. This exposure to scientists as individuals, and the opportunity to interact with them in a social setting, is often a rare and invaluable experience for attendees.

AoT also provides networking and professional development opportunities for scientists at many levels. Most AoT events take place in cities with multiple academic and cultural institutions and thus provide networking opportunities for scientists from different institutions in addition to interactions with the general public. The format of multiple short talks also means



**Figure 3.** Emily Rice as “DJ Carly Sagan” (left) and the audience watch a presentation on rocketry by AMNH educator Russ Taragan and prepare to launch their own straw rockets at an AoT NYC event in May 2014. Glow necklaces are rewards for asking questions. Credit: Brian Levine

that several different topics will be presented (optionally organised around a theme), and scientists can benefit from this exposure to research outside of their sub-field. Events often include visiting scientists and presenters from other fields (engineering, education, writing, art, etc.) allowing for even broader exposure and networking opportunities. The typical format of multiple short talks combined with the informal, social nature of the events allows presenters to experiment with their presentations in a low-stress environment. Presenters have to actively maintain the audience’s attention so vocal projection and stage presence are required even more than in a typical academic presentation. We suspect that practising these skills in a bar can help scientists improve the quality of their presentations in other venues as well.

### Formation, expansion, and organisation

AoT began with two events called “Astronomy Uncorked” in New Haven, Connecticut, USA in 2012. They were organised by Meg Schwamb, who was at the time a postdoctoral fellow at Yale University. She initiated events in New York City (NYC) starting in April 2013 and continued them with the help of Emily Rice. By the end of the year there were nine AoT-branded events in New York City, including two “AoT Uptown” events organised by Columbia University graduate students and the first “Astronomy

on Deck” in the Space Shuttle Pavilion at the Intrepid Air, Sea, and Space Museum with over 400 people, and two events in Columbus, Ohio, USA organised by Demitri Muna.

A reflection on the first year of events was presented in a poster at the 223rd American Astronomical Society (AAS) meeting. This garnered tremendous interest, and by the end of 2014 regular events were established in New Haven (Connecticut, USA), Toronto (Ontario, Canada), Santiago (Chile), and Austin (Texas, USA) (Rice et al., 2014). In 2015 events began in Seattle (Washington, USA), Denver (Colorado, USA), Rochester (New York, USA), Baltimore (Maryland, USA), Lansing (Michigan, USA), Tucson (Arizona, USA, a re-branding of events formerly known as Space Drafts), Washington (DC, USA), and Ann Arbor (Michigan, USA). Also in 2015 several new organisers were inspired by a presentation given by AoT organisers at the International Astronomical Union (IAU) General Assembly in August (Livermore & Silverman, 2015).

An overview of the expanded AoT community was presented in a second AAS poster in January 2016 (Rice et al., 2016) and by March 2016 events had begun (Urbana and Chicago in Illinois and Santa Barbara and Palo Alto in California, all in the USA). The hope is that by improving the coordination of procedures and resources described below, we will provide support

for further expansion of existing events and new locations around the world.

Coordination of the independent “satellite” locations (pun intended) is led by Emily Rice, Demitri Muna, Jeffrey Silverman, Rachael Livermore, and Meg Schwamb. Online resources for satellite locations are developed and disseminated for event planning and promotion. This is done through the website<sup>2</sup>, social network accounts of AoT and the satellite locations themselves, and a “Host Stars” (organisers) Google group.

Currently only a few locations conduct audience surveys for demographic information and event evaluation, but organisers are planning on adding procedures for tracking attendance, conducting audience surveys, and obtaining presenter feedback to our advice package, known as the Launch Manifesto.

### Summary of existing satellite locations

Satellite events are run independently, with local organisers adapting the suggested guidelines to suit their resources, presenters, and local community. In some locations events take place monthly, while in others they are held every 2–3 months. Several locations have switched, or rotate through, venues, some in search of bigger space and/or better equipment and some in order to reach different geographical populations. Organisers are most typically postdoctoral researchers or graduate students but can also be science and/or outreach staff and science educators.

The first satellite locations were started by scientists who had presented at (or attended) an AoT and then moved to another city, or who learned about the events through visiting scientists. The expansion of the AoT universe has been accelerated by several presentations at research conferences, including the AAS and IAU (Rice et al., 2014; Livermore & Silverman, 2015; Rice et al., 2016). Interestingly, a non-astronomer who had attended an event in NYC initiated the satellite location in Denver, Colorado, USA. Table 1 summarises the first three years of events and lists approximate cumulative attendance for each satellite location.

Location (USA unless otherwise noted)	Number of Events	Organisers & Affiliations*	Approximate Total Cumulative Attendance
New York, NY	51	Emily Rice (CUNY/American Museum of Natural History (AMNH)), Brian Levine (AMNH), Jeff Andrews, Dan D'Orazio, Adrian Price-Whelan (Columbia University), Meg Schwamb (Yale University)	3000
Columbus, OH	8	Demitri Muna (The Ohio State University)	450
New Haven, CT	10	Stephanie LaMassa, Bhaskar Agarwal, Grant Tremblay (Yale University)	1000
Santiago, Chile	7	Amy Tyndall (European Southern Observatory)	250
Austin, TX	17	Jeffrey Silverman, Rachael Livermore (University of Texas at Austin)	3655
Toronto, ON, Canada	7	Stephanie Keating, Lauren Hetherington, Zoë Jaremus, Max Millar-Blanchaer, Michael Reid, Chris Sasaki, Michael Williams (University of Toronto)	750
Seattle, WA	14	Kristen Garofali, Brett Morris, Nell Byler (University of Washington)	1700
Denver, CO	5	Adalyn Fyhrie, Morgan Rehnberg (Colorado University at Boulder), Quyen Hart (Regis University), Josiah Albertsen	250
Rochester, NY	4	Jennifer Connelly (Rochester Institute of Technology)	200
Lansing, MI	7	Devin Silvia (Michigan State University)	1000
Baltimore, MD	1	Jackie Radigan, Joel Green (Space Telescope Science Institute)	150
Tucson, AZ	7*	Gautham Narayan (National Optical Astronomy Observatory/ University of Arizona), Sarah Morrison (Lunar Planetary Laboratory/ University of Arizona), Evan Schneider (Steward Observatory/University of Arizona)	600**
Washington, D.C.	3	Stephanie LaMassa (NASA Goddard Space Flight Center)	300
Urbana, IL	2	Meagan Lang, Joaquin Vieira (University of Illinois at Urbana-Champaign)	200
Ann Arbor, MI	2	Yuan Li, Keren Sharon, Aleksandra Kuznetsova, Erin May (University of Michigan)	100
Chicago, IL	1	Benjamin Nelson, Laura Sampson (Northwestern University), Megan Bedell, Nora Shipp, Gourav Khullar, James Lasker, Laura Kreidberg (University of Chicago)	70
Santa Barbara, CA	1	Iair Arcavi (Las Cumbres Observatory Global Telescope Network, University of California, Santa Barbara)	200
Palo Alto, CA (Bay Area)	1	Sean McLaughlin (Stanford/Stanford Linear Accelerator Center (SLAC)), Mandeep Gill (SLAC)	90
"Fly-by" events***	3	Washington, D.C., Chicago, Taipei	150
Total	151	Total	14115

**Table 1.** Summary of AoT events April 2013–March 2016.

\*Affiliations listed were accurate at the time of event organisation and may have changed.

\*\*Not including fifteen previous events under the previous title "Space Drafts".

\*\*\*One-time events, two of which occurred in the same city where regular events were started later by different organisers so are listed separately.

Creative Element	Branch of AoT listed by state (USA unless otherwise noted)	Details of Creative Element
Format	Austin	Creates themed introductory videos for each event, records each presentation, and posts videos on a YouTube channel <sup>9</sup> .
Format	NYC	Screened all thirteen episodes of COSMOS: A Spacetime Odyssey (2014) at “Cosmos on Tap” events, with a special guest commentator and game for each episode.
Format	Seattle	Occasionally screens episodes of Cosmos: A Personal Voyage (1980).
Format	Baltimore	Held their first event at a live music venue in conjunction with Space Dance (a DJ dance party).
Format	Austin and Santa Barbara	Have a segment of “Astronomy in the News” between talks, showcasing and explaining recent astronomical news items.
Format	NYC	Has collaborated with the Intrepid Sea, Air, and Space Museum, the international Pint of Science festival, the World Science Festival, and NYC STEMFest to host events as part of broader science-based productions.
Merchandise	Multiple locations have logo merchandise to sell and/or give away as prizes	AUSTIN: t-shirts, can koozies, pint glasses, buttons, stickers NYC: buttons, stickers Lansing: bottle openers, etched glasses, coasters Seattle: etched glasses Santa Barbara: etched glasses Chicago: stickers, etched glasses, t-shirts Tucson: t-shirts Washington, DC: buttons, stickers
Funding	Austin and Lansing	Solicit donations via competitive polls. Some of the polls included so far have been: Star Wars vs. Star Trek and Should Pluto be a Planet?
Funding	NYC	Collects donations via mascot “space bear” (plastic bank painted like an ursine astronaut) and gives away “Neil Tyson’s Trash Treasures” as prizes.
Funding	Austin	Was offered a beer sponsorship by Odell Brewing Company: their beer is now on tap at the venue and they donate prizes.
Funding	NYC	Offer drink discounts during events and gave away prizes donated by two beer companies.
Funding	Lansing	Is provided support from their venue in the form of rented sound equipment and the donation of gift cards to give away as prizes.
Funding	Tucson	Sells donated pizza to raise funds for visits to local schools.
Funding	Rochester	Collects donations via mascot “space pig” (black chalkboard piggy bank) and gives away prizes donated by the Strasenburgh Planetarium at the Rochester Museum and Science Center.
Funding	Seattle	Give away custom cupcakes donated by a local bakery, Trophy Cupcakes and Party as prizes.
Accessibility	Rochester	Events have an American Sign Language interpreter available by request.
Miscellaneous	Seattle and Lansing	Venues brew custom beers given astronomically themed names selected by AoT fans. Lansing will be featured at a local beer festival to pour the above-mentioned beers and talk with the public about astronomy.

**Table 2.** Highlighting creative alterations to various elements of the AoT model from various satellite locations.

A major advantage of AoT-style events is the existence of recommended guidelines and resources, as will be detailed below, in combination with significant flexibility in format and content. Some of the examples of creative approaches adopted by various satellite locations are listed in Table 2.

### Starting a new satellite location

Several AoT organisers have drafted a Launch Manifesto that details effective practices for many aspects of AoT events, including finding a venue, scheduling and promoting events, recruiting and preparing presenters, resources for games, trivia, music, and prizes, and how to live stream or record and edit events for the internet. In addition to the crowd-sourced document, there is an active AoT Host Stars (organisers) Google group for discussion of issues that arise.

Some of the most important information needed for organising AoT events is summarised below, and we encourage those interested in starting a new event and looking for more information about our manifesto to get in touch via this form: [bit.ly/AoTAAS227](http://bit.ly/AoTAAS227) or our gmail address: [astronomyontap@gmail.com](mailto:astronomyontap@gmail.com).

### Finding a venue

One of the biggest hurdles to starting an event series is finding a venue. Many AoT locations have experimented with several different venues before finding a good fit with their event and audience. We recommend approaching bars in person to appraise the space and equipment, meet the staff, and explain the event's purpose and format, after calling ahead to make sure a manager, booker, or owner will be available. We avoid paying venue fees whenever possible, because they are generally outside of our (negligible) budgets. These fees can often be avoided by holding events on less popular nights for venues like Monday or Tuesday. The essential requirement for a venue is functional, reliable audio/visual equipment: screen and projector and/or large televisions and an audio system with at least one microphone. Optimal venue layouts provide sufficient space for the audience to sit with bar access at the rear or side of the audience, or table service. It is up to the organisers to

prioritise the accessibility of the bar, proximity to public transportation, and ease of parking, depending on the needs of local community. Finally, events are much easier to coordinate with supportive venue staff who are reliable and communicative.

### Suggested format and logistics

We encourage having one or more organisers act as creatively-named masters of ceremonies (e.g. DJ Carly Sagan, MC Tycho Brewhaha, MC SuperDuperNova, MC High-z, MC Nebrewla, DJ Bailey's Comet) to warm up the crowd, play music, explain games, introduce speakers, and encourage questions. We have found that between two and four short presentations minimises the pressure on any one presenter and gives presenters freedom and flexibility to experiment. It also allows for an evening to be themed around particular content while presenting a variety of aspects and viewpoints. We typically schedule one or two breaks in the programme and end early enough that socialising can continue afterward. Most locations do equally timed talks with time after each for questions. Scheduling of presenters in the programme should take into account their experience level and audience flow. For example, AoT NYC schedules presenters with less experience earlier in the programme so they have a smaller, fresher audience. More experienced presenters headline in the later slots when they may be presenting to a larger, and possibly more drunk, rowdy, and/or tired crowd. Conversely, AoT Austin schedules the least experienced presenter as the middle of three in order to start and end with strong presenters.

### Funding

The required monetary costs of AoT events are minimal, especially with venues that do not charge for space or equipment and with access to institutional resources for audio visual equipment, printing and web hosting. Costs can include small prizes that are given away, materials like pens/pencils for filling out games cards or surveys, and presenter costs that are reimbursed. Venues may contribute tips to AoT and/or help encourage donations from attendees. The non-monetary costs, which are potentially significant, include the generally unpaid

time and energy of organisers, presenters, and other volunteers who design fliers, promote events, maintain websites and social media accounts, as well as sell merchandise, explain the trivia/games, award prizes, live post on social media, and record video at events.

Many locations collect donations, some invest in logo merchandise to sell at a profit, and several are institutionally subsidised. Institutional support provides publicity, prizes, and/or meals and drinks for speakers and organisers. AoT Tucson sells donated pizza by the slice to support outreach visits to local schools. For certain events, tickets are offered for a nominal fee of ten US dollars or less when partnering with other event series, and profits are shared between AoT and the event organisers. More information about funding models can be found in Table 2.

### Presenting

Presenters have included professional and amateur astronomers, planetary scientists, physicists, engineers, and educators along with occasional appearances by writers, designers, artists, filmmakers, and other professionals with astronomy- or science-related projects. The science presenters represent a range of career stages including post-baccalaureate researchers and educators, graduate students, post-doctoral scientists, research scientists, and professors.

The best talks are accessible and engaging, with a straightforward but compelling concept or narrative, and limited to ten to twenty minutes of uninterrupted presentation. Because these events are held in a bar, speakers are not guaranteed a captive or even necessarily respectful audience. Presenters should be prepared to actively earn the attention of the audience in order to maintain their engagement. This is a useful skill to practice and improve for teaching, outreach, networking, and more (Kuchner, 2011). We recommend TED-style slides: visually striking but simple with little or no text and featuring clearly explained and well-motivated science figures, and as much humour, pop culture, and even profanity (without insults or offensiveness) as the presenter would like.



**Figure 4.** Astronomer Jana Grceвич (AMNH) presents at a Hubble Space Telescope themed Astronomy on Tap NYC event in April 2014. In the lower left are glow necklaces that are offered as rewards for asking questions. Credit: Brian Levine

We also encourage presenters to include creative or personal aspects in their presentations, because as part of the second goal of AoT, we want to not only convey science content but also represent the humanity and culture of science and scientists, to make them accessible and relatable to the public. Audiences respond very positively to, and ask many questions about, the stories of how people became scientists, what their personal opinions are, and the mistakes, pitfalls, and other behind-the-scenes stories of research.

## Evaluation

Methods of evaluating the success of AoT events are currently limited to estimates of attendance (sometimes tracking new and returning attendees) and subjective assessment based on the organisers' observations and interpretation of audience engagement, anticipation, and reactions in person and on social media. AoT Austin does, however, conduct monthly surveys in conjunction with trivia questions to estimate audience demographics, find out how people learned about the event, and allow attendees to suggest future topics and provide comments. Their typical response rate is 15–20% with an average attendance of 220. Survey results indicate that their audience consists of about 50% female and 15% black or minority ethnic attendees, which is consistent with their by-eye estimates of the entire crowd. Most of the comments are positive, and a couple of comments each month have useful criticisms or suggestions. A template

based on the AoT Austin audience survey was recently made available to organisers of all AoT locations.

## Acknowledgements

The authors gratefully acknowledge the AoT Host Stars (organisers) listed in Table 1 for their tireless devotion to expanding the AoT Universe and Jeffrey Silverman for contributions to the text.

## Notes

- <sup>1</sup> More information on past AoT events: <http://astronomyontap.org/events/past-events/>
- <sup>2</sup> Visit the AoT website: [www.astronomyontap.org](http://www.astronomyontap.org)
- <sup>3</sup> Themed introductory videos from the Austin AoT: [https://www.youtube.com/channel/UCGCrrMV2fwbA9\\_46Devd09g](https://www.youtube.com/channel/UCGCrrMV2fwbA9_46Devd09g)

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## Biographies

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**Brian W. Levine** is a Manager of Youth Programmes and an Astrophysics Educator at the AMNH in NYC. He runs a unique seven-year extracurricular science programme for school students. Additionally at AMNH, he presents in the planetarium and assists with several recurring public programs. He co-organises and hosts Astronomy on Tap New York City events and is involved in other science outreach efforts in and around NYC. He has a BSc in Astrophysics and is a candidate for an MSc in Science Education with a concentration on Free-Choice Learning.