

THE NIGHT SKY BECKONS

DESIGNING INNOVATIVE PUBLIC ENGAGEMENTS FOR ASTRONOMY

An interview with Anita Zanella
Staff researcher at
National Institute for Astrophysics, Italy



What keeps you awake at night? For Zanella, it is the night sky full of stars. For three years since 2016, Zanella has been a research fellow at the European Southern Observatory (ESO) based in Germany. As part of her fellowship, she spent 40 nights at the Paranal Observatory in Chile each year to work on the Unit Telescope 4 of the Very Large Telescope (VLT). She carried her love for astronomy to her current job as a staff researcher at the National Institute for Astrophysics in Italy, where in addition to her research, she is responsible for education and public outreach.

From organising the annual Astronomy Festival in Castellaro Lagusello, Italy, to designing educational resources for primary and secondary school pupils, Zanella is constantly learning from interactions with persons with disabilities and transforming insights into new ideas for accessible public engagements.

Zanella is also active on the global stage. As a member of the Sonification World Chat, and a co-organizer of the Audio Universe workshop in the Netherlands in 2022, she brought together the “stars people”, such as astronomers and astrophysicists, and the “sound people”, such as sound engineers and musicians, to explore interdisciplinary opportunities for sonification as a tool for disability inclusion in astronomy and to discuss ways to overcome the challenges.

Nowadays, the night sky means more than just stargazing for Zanella. The universe can be explored using all senses, thus engaging persons of all abilities.

In this interview, Zanella shares information on her projects and her hopes for the future of sonification.

“Working side-by-side with disabled people changes our perception of reality and the environment that surrounds us, widening our own understanding, empathy, and perception. It definitely has changed mine.”

UNOOSA: Could you tell us about your background and how you started working with outreach in Astronomy?

Zanella: Despite my passion for literature and humanities, I decided to study astronomy at university. I got my Bachelor's and Master's degrees from the University of Padova, after spending some months at the University of Minnesota in the U.S. to work on my thesis. I then moved to the Commissariat à l'Énergie Atomique in Paris for my PhD and then to the ESO in Munich for an independent research fellowship. During my time at ESO, I often visited the Very Large Telescope in the Atacama Desert in northern Chile to conduct observations, which was a wonderful experience.

I have been a staff researcher at the Istituto Nazionale di Astrofisica (National Institute for Astrophysics) in Italy since 2019. I study how distant galaxies formed and evolved and why they change color and shape as time goes by.



Anita Zanella at the Very Large Telescope, the observatory of the European Southern Observatory, in the Atacama Desert (Chile) where she was working as a night astronomer. Credit: Anita Zanella

I am also very passionate about outreach and education. For three years, I have organized an Astronomy Festival in Castellaro Lagusello (Italy), and I co-designed educational resources for primary and secondary school pupils. For the past few years, I have dedicated an increasing amount of time to understanding how sound can be effectively used to represent astronomical data through a process known as sonification.

“I enjoy the thrill of discovery, the tickle of new ideas that sparkle, the constructive interactions with students and collaborators, the warmth of the human interaction with the public during outreach and the amazement of kids when learning about astronomy.”

In your interview with [ESO](#) and [Gazzetta di Mantova](#), you explained that you had an opportunity to make observations for your research and use the telescope in Chile. You were able to observe the optical counterpart of a gravitational wave, which you described as a once-in-a-lifetime opportunity. How does it feel to be part of this historical project?

The memories of those nights are very intense and still feel very close. I remember the excitement in the telescope control room, the feeling that something historical was happening — although it was still not completely clear what was going on, the fear that we could make a mistake and miss the event, the collaboration among all the team members and the common wish to achieve, together, the same goal. I feel immensely grateful for the opportunity to live through those moments.

Could you tell us what got you started on accessibility in astronomy?

I became interested in using sound to represent data through sonification and its application for accessibility some years ago while I was an independent research fellow at the ESO. I had started to work with amateur astronomers in Italy to make astronomy public engagement accessible for persons with visual impairment. At the same time, I was brainstorming with other professional astronomers about the possibility of using sonification for research purposes. I became convinced that to advance in the field, we needed to contact sound experts — namely sound designers, musicians, sound engineers and researchers in psychoacoustics. This was the start of the [Audio Universe](#) project, which began in 2021 with a meeting hosted by the Lorentz Center in the Netherlands



Astronomers enjoy the sunset at Paranal, on ESO's Very Large Telescope's platform, just before the beginning of their night-time observations. The dome of one of the VLT's Auxiliary Telescopes is seen in the foreground. The crescent Moon and, to its left, planet Venus, make for a beautiful scenery. Credit: ESO/Y. Beletsky

“I was motivated by the beauty of the night sky and of astronomy in general. I wanted to share it with everyone, regardless of disabilities.”

I was also motivated by the possibility of working with people who had very different experiences from me (such as astronomers and audiences with visual impairment) and different expertise (such as musicians, researchers of psychoacoustics, sound designers and educators).

You were one of the organizers of the “The Universe in all Senses” festival. Could you tell us more about the festival?

I have been organizing the annual Astronomy Festival in Castellaro Lagusello, Italy, since 2021. Every year, the festival has a different theme. This year was dedicated to multi-sensoriality, hence the title. The idea is that all the activities — namely exhibitions, interactive, hands-on workshops, observations of the Sun, the night sky and the sunrise, conferences and shows simultaneously involve multiple senses. Naturally, sonification is one of the key techniques used during the festival. We paid particular attention to advertising the festival to audiences with disabilities and engaging them at every stage. We were especially attentive to persons with visual impairments, who have traditionally been excluded from astronomy outreach.

One of the main challenges is transforming the village where the festival happens into a welcoming and safe environment for everyone. No cars were allowed during the festival, and guides were available throughout the village to offer assistance and information. The guides were volunteer high school students who were trained by the festival organizers in collaboration with experts from the Italian Union for the Blind and Visually Impaired.

How were the activities during the festival designed with persons with disabilities in mind?

All the hands-on workshops were developed by PhD students of the University of Bologna as part of the course “Designing innovative public engagement activities” that I teach. Such workshops were meant to be accessible to persons who are blind. As part of the design process, they were tested with primary school students and some adults, including some with visual impairment. The workshops were

modified to include the feedback received during the testing phase. The final modified version of the workshops were brought to the festival.

At the beginning of the next school year (September–October 2023), we will organize trainings for teachers focusing on the activities that have been developed for the festival. I hope in this way, sonification will become a mainstream tool in teaching scientific disciplines.



The opening of the Astronomy Festival in Castellaro Lagusello, Italy, June 2022. Credit: DigitalSim.

Castellaro Lagusello, the town that will host the festival, has also recently been awarded a grant for the “Zero barriers” project, aimed at removing all architectural barriers for visitors with disabilities (e.g., steps, traffic lights). This project and the festival are independent, but I believe that together will deliver a very strong and important message to the visitors.

Do you think adopting a multi-sensorial approach, such as sonification, and having persons with and without disability working on the same project with the same medium will change the perception of disability?

I think that sonification is key to encouraging collaboration between researchers who are sighted and those who have visual impairments. I also believe that it is imperative to make science education accessible to all pupils and let the blind learn together with their peers. Working side-by-side with disabled people changes our perception of reality and

the environment that surrounds us, widening our own understanding, empathy, and perception. It definitely has changed mine.

You mentioned the important role that sonification can play in engaging persons with visual impairments. What do you hope to achieve from the Audio Universe project and what are your greatest takeaways?

Having workshops like Audio Universe is key to bringing professionals with different expertise together to work on sonification. Astronomers collaborated with sound designers, musicians, educators and psychologists. Participants, both with and without visual impairments, attended. The initial phase of introductions allowed us to learn about each other and find a common language. The interaction has been incredibly smooth and fruitful, and we all learned a lot from each other.

Thanks to that workshop, we have highlighted some open questions. For example, how important is standardization? Customization? What is the role of culture in sonification? How can we make sonification mainstream? How can we overcome the scepticism that we often face when talking about sonification to researchers?



Chris Harrison and Anita Zanella working at the Audible Universe conference. Credit: Kate Meredith.

We have also discussed some possible ways to move forward. For example, conduct rigorous tests about the effectiveness of sonification, identify the best mapping depending on the

application, publish results in peer-reviewed journals to disseminate results and get credit, publish tutorials of sonification tools to encourage their use and create an archive where sonification papers can be gathered.

What have you learned from working with people with disabilities? What are some of the misconceptions that the public has about persons with disabilities?

One of the main lessons I learned is that the needs and perceptions of persons with different disabilities are different. For example, the perception of distance is different for people who are born blind or those who became blind as adults. The concept of colour and many other parameters changes too.

A student who has been blind since birth told me that it was difficult for him to understand the challenges sighted people have when they try to imagine something (for example, a dataset) with more than three dimensions. He has no problem imagining objects (or datasets) with more than three dimensions. The same was not true for a student who was born sighted and became blind instead, as he had maintained a sense of distances and the three-dimensional space where he has been immersed.

Could you share your experience on what works and what doesn't when organizing events for persons with disabilities?

It is important to involve persons with disabilities in organizing the events and ascertain their needs. Their feedback on possible challenges and solutions is key. This is what we did when organizing the Audible Universe workshop in December 2022.

Understanding the different needs of the participants allowed us to prepare different versions of the same information. For example, we had a tactile map of the venue, an audio description and a guided tour of the building for the blind participants. In this way, different needs can be accommodated simply by communicating through different channels.

“One of the main lessons I learned is that the needs and perceptions of persons with different disabilities are different.”

What do you wish someone would have told you about disability and accessibility in the STEM field?

I would have liked to know that there are tools and means, such as sonification software, that can be used for accessibility in astronomy and STEM in general. I would have also liked to know that there are people working on this, both with an astronomical background and with a sound design and musical background. Finally, I would have liked to know that there are some visually impaired astronomers.



Anita Zanella introducing the astronomer Stefano Sandrelli who was a speaker at the Astronomy Festival in June 2022. Credit: DigitalSim.



Audible Universe conference at the Lorentz Center, The Netherlands, December 2022. Credit: Lorentz Center.

How do you envision the future of astronomy?

I hope that in the near future, astronomy research, public engagement and education will become multi-sensory. This would make it not only more accessible to all but also more engaging. We can reach a better understanding of the phenomena that surround us.

I would like to see sonification tools become mainstream in the educational environment and at the research level. I would really like teachers to start systematically using sonification in schools when teaching STEM disciplines so that blind and visually impaired students do not have to leave the classroom and instead can learn together with their peers.

I would like sonification to be used up to the university level to allow students with visual impairment to become astronomers (or scientists in general) without having to invent (or re-invent) sonification tools over and over. Such multi-modal learning would be very useful for sighted students as well, that could choose, at each stage, their preferred learning style and sense.

And at the research level, I would like journals to have sonified versions of the plots so that everyone can have full access to papers. Sonification software should be an accepted tool for data exploration.

“I hope that in the near future, astronomy research, public engagement and education will become multi-sensory. This would make it not only more accessible to all but also more engaging. We can reach a better understanding of the phenomena that surround us.”

What advice would you give to persons with disabilities who want to study or work in astronomy?

An academic career can be very demanding, and there are sometimes moments when everything seems more frustrating than its worth. My advice is to talk about this to people and to look for support, understanding and specific help depending on the specific situation. You might find someone who has experienced the same trouble and can offer a solution or at least a direction to pursue. You might have an idea that you did not think about, you might discover something you did not know, or you might find the energy that you were missing to make the next step.



Could you point us to some resources or communities that could be useful for persons with disabilities who want to study or work in astronomy?

A way to get in touch with people working on sonification is to attend the Sonification World Chat, started by Kate Meredith and [GLAS Education](#) in 2021. It brings together a large group of scientists and sound designers working on sonification. Its mission is to enhance inclusion in STEM. To be added to the mailing list, you can write to kate@glaseducation.org ■

The Milky Way looms over the Residencia at the Paranal Observatory in Chile's Atacama Desert. This residence provides shelter and comfort for those who work at Paranal's telescopes, telescopes like ESO's Very Large Telescope (VLT). Credit: John Colosimo (colosimophotography.com)/ESO

BIO

Anita Zanella graduated with a Master's degree in Astronomy from the University of Padova (Italy), after spending some months at the University of Minnesota (U.S.) to work on her thesis. From 2013 to 2016, she did a PhD in Astrophysics at the Commissariat à l'Énergie Atomique (Paris, France) and then moved to an independent research fellowship to the European Southern Observatory (ESO) (Munich, Germany). During her time at ESO, she served as night astronomer at the Very Large Telescope (Chile). Since 2019, she is a staff researcher at the Istituto Nazionale di Astrofisica (National Institute for Astrophysics) in Italy. Zanella is passionate about outreach and education. In the recent years she has dedicated an increasing amount of time to understand how sound can be effectively used to represent astronomical data.

RESOURCES

- [Audible Universe](#): Audio Universe is a collection of tools and resources to support scientists, educators, students, and the general public to represent scientific data and concepts with sound, as well as with other senses.
- [Festival of Astronomy: the Universe in all senses](#): In this third edition of the festival, all of the activities are multi-sensory, namely they will include not only visual elements, but also tactile and sound elements. In this way, all visitors, sighted and blind, will have equal access to astronomy, and will discover new ways to explore the universe.
- [GLAS Education](#): GLAS Education provides inclusive STEM experiences for individual, local, and global good through innovative educational programs that are anchored in a vibrant multigenerational community.
- [International Astronomical Union \(IAC\) Working Group on Astronomy for Equity and Inclusion](#): The working group's objective is to address the systemic structure, functions, processes and attitudes that result in the exclusion or restricted participation of under-represented groups in the field of astronomy.

CONTACT



anita.zanella@inaf.it

ABOUT

This article is part of the “Space+: Pathways for All Abilities” interview series under the United Nations Office for Outer Space Affairs Space for Persons with Disabilities project. The aim of this interview series is to raise awareness of the importance of disability inclusion and to advance inclusive and equitable development in the space sector through sharing the experiences of and lessons from disability advocates and persons with disabilities in space.



Disclaimer

The views expressed in this publication are those of the contributors and do not necessarily reflect the views or policies of the United Nations. The United Nations does not accept responsibility for the accuracy or completeness of the contents and shall not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on, the contents of this publication.

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries. In addition, mention of the names of firms, trademark names, logos and commercial products does not imply the endorsement of the United Nations.

Information on uniform resource locators and links to Internet sites contained in the present publication are provided for the convenience of the reader and are correct at the time of issue. The United Nations takes no responsibility for the continued accuracy of that information or for the content of any external website.

This publication has not been formally edited.

United Nations Office for Outer Space Affairs
Space for Persons with Disabilities project
August 2023