

Aruba's first planetarium: A work in progress

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The Space and Nature Aruba Foundation (SNAF) has acquired a mobile inflatable planetarium with the goal of inspiring young students on the island of Aruba to pursue careers in science and technology. Despite lacking the necessary funds to buy an off-the-shelf projector for the planetarium, SNAF debuted it to the public on 14 October 2024 during the partial solar eclipse. Ideally, the mobile planetarium will introduce young students to the wonders of the Universe and inspire them to pursue careers in science and technology, making astronomy and Earth science accessible to the local community.

Astronomy in the Dutch Caribbean

Aruba is part of the Dutch Caribbean Islands: Aruba, Curacao and Bonaire (the Lesser Antilles), and Sint Marten, Sint Eustatius and Saba (the Leeward Islands). These islands are known for their beautiful beaches and warm climate and are a popular vacation destination for tourists worldwide.

Currently, astronomy has a small presence in the Dutch Caribbean Islands. Some astronomy enthusiasts often share their knowledge of astronomy by organizing sidewalk astronomy events and sharing their astrophotography with the rest of the world on Facebook. However, to our knowledge, only two organisations are dedicated solely to astronomy: the Lynch Planetarium and Museum on Sint Eustatius and the Space and Nature Aruba Foundation (SNAF) in Aruba. In this article, we will focus on the current activities of SNAF.

The history of the Space and Nature Aruba Foundation

SNAF began as a collaboration between two lifelong astronomy enthusiasts who actively engage the public with astronomy through school visits and public events. The Foundation has snowballed through amateur astronomy connections. Though it began as a group of people who thought it would be nice to do astronomy together, we

started to organize workshops, star parties, and other events. In 2017, our group officially became the Space and Nature Aruba Foundation, and the same people who started in 2015 are now the Board Members.

Currently, SNAF has no official programme, as the Board consists of volunteers – SNAF depends in their free time. For now, SNAF primarily engages the public through lectures requested by schools, scout groups or vacation camps. Over the next year, we hope to set up some fixed public activities covering space and nature. These fixed events will centre around predictable

astronomical phenomena such as planetary oppositions and solar or lunar eclipses. Through these fixed public activities, SNAF will be able to bring in a reliable income to develop more teaching materials in Papiamentu, the primary language spoken on the island.

To reach its goals, SNAF must recruit volunteers available to do school events during the day, perhaps by working with a teacher volunteer at every school. Ideally, this would be a science teacher who can be trained and use SNAF's materials to lecture at their schools.

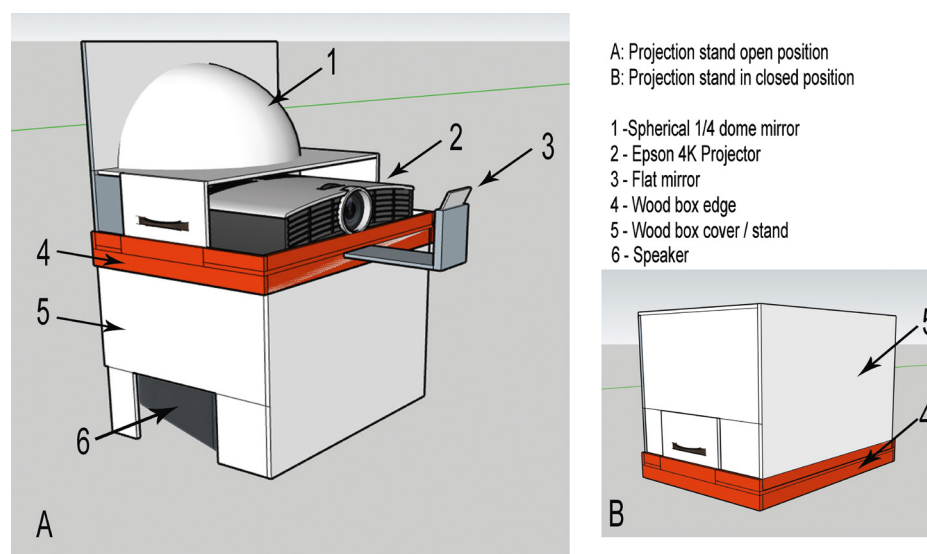


Figure 1: A schematic of the SNAF projector stand.

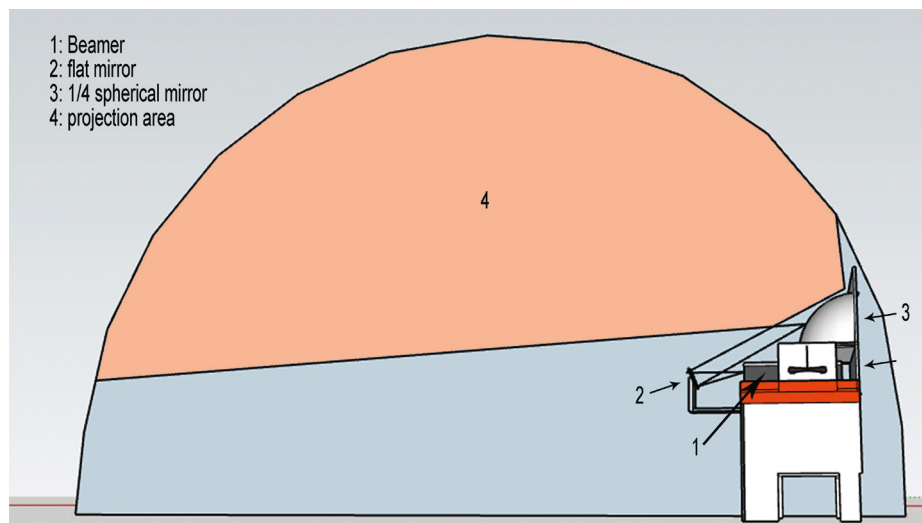


Figure 2: A schematic of the projection area showing the projection setup and its components.

The SNAF mobile planetarium

Just before Covid- 19, the members of SNAF were discussing options for purchasing a mobile planetarium and brainstorming about several companies that sell complete sets of planetariums. Unfortunately, these companies were too expensive for SNAF. One of the members came across a DIY mirror projector (*Bourke, 2005*). This system would perform as a typical planetarium projector for a fraction of the cost of a dedicated planetarium projector but would mean that we need to edit the video to be projected properly. Though the system was bulky and used a small computer table, the projector system could be easily transported and used. Using this as a base schematic, we began to

design a new system that could be used as a storage box, a stand and a speaker container at the same time (Figure 1). Figure 2 shows how the projector system works; the beamer projects the image onto a flat mirror that reflects onto a spherical mirror and subsequently onto the planetarium dome.

While testing the planetarium, we concluded that if the video is too bright, it loses its essence, and the seams of the dome become noticeable; a dark video produces a truly immersive experience. The typical full-dome videos used for planetariums cannot be used with the mirror system described here, as the image will be distorted. Normally, a full-dome video needs to be warped in order to be projected

correctly in the planetarium, represented in Figure 3 with a polar grid, as might be seen in a full-dome projection and a warped frame suitable for projection with a spherical mirror.

Unfortunately, no free pre-warped projection videos are available online; specialised software is required to appropriately warp the full-dome videos.

To avoid this extra cost, we instead used a typical flat video. One drawback of using typical square videos is that the edges of the image will be clipped, as seen in Figure 4. This clipping will give extra unnecessary illumination in the planetarium. This can be minimised by painting the back panel matte black.

The SNAF mobile planetarium debuted publicly during the annular eclipse on 14 October 2023. During this event, we gained some new insights:

- The back panel that holds the 1/4 dome mirror needs to be painted matte black to minimise the reflection of the projected video.
- To help senior citizens in the planetarium, the entrance must be illuminated, and chairs must be provided.
- Several people commented that they enjoyed the movie but would prefer it to be in Papiamentu to understand it better.
- Because the air temperature in Aruba is consistently around 32°C, we needed to acquire an air conditioning system for the mobile planetarium. For the first trial, we decided to put the planetarium in an air-conditioned auditorium (Figure 5), where the temperature in the auditorium was about 24°C. We found that the temperature inside the planetarium dome was always somewhat higher than the room's temperature, even with no people inside.
- The planetarium needs about 15 minutes to cool down again after 20 people visit and sit in the dome for roughly 10 minutes. Otherwise, we must use an internal air conditioning system, which poses a unique challenge. The operation of the fan to maintain the planetarium inflated, plus the beamer and computer operate at 6 Amps. The air conditioning system works with 8 Amps. During previous testing, we noted that the inflation fan and air conditioning system could not work

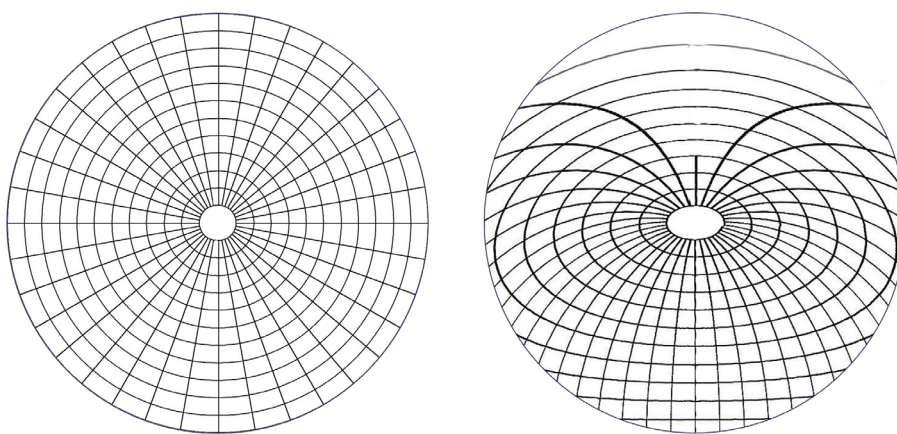


Figure 3: A representation of the full-dome (left) and warped full-dome (right) projections. Full-dome videos must be warped to use a projection system containing a spherical mirror. Image Credit: After Bourke (2007)

together on a single fuse. This imposed a challenge as each classroom only has one fuse for the whole classroom. This would require using an external power source or an extension cord to use the fuse of another classroom to power the air conditioning system.

Conclusions

Some further research needs to be done to produce local materials for the planetarium. This might include working with local teachers to understand the standard curriculum as well as students' interests to develop lesson plans and other materials for the planetarium.

Despite the distortion of the projection image close to the mirror, the audience enjoyed their time at the planetarium and expressed interest in seeing different kinds of movies presented in Papiamentu. The next phase for the planetarium will be to train teachers from different schools to operate the planetarium so they can use it at their school. Additionally, we hope to film local movies about the Aruban flora and fauna to provide an exciting opportunity for the public to explore and learn about the Universe.

In Aruba, astronomy is not part of the official curriculum. However, some high school students are expected to do fieldwork in math, chemistry or physics. Their teachers



Figure 5: The first run of the SNAF mobile planetarium showing the dome inside the air-conditioned auditorium during its first run.

often encourage the students to contact SNAF for guidance on topics related to astronomy.

SNAF's mission is to increase the love for space and nature on the island of Aruba. We hope we can spark children's interest in STEM, creating a snowball effect that inspires the next generation to pursue a career in science.

Acknowledgements:

We would like to express our appreciation to all the individuals and organisations who contributed to the Space and Nature Aruba Foundation's efforts to bring astronomy and earth science education to the public through various initiatives, including acquiring a mobile inflatable planetarium.

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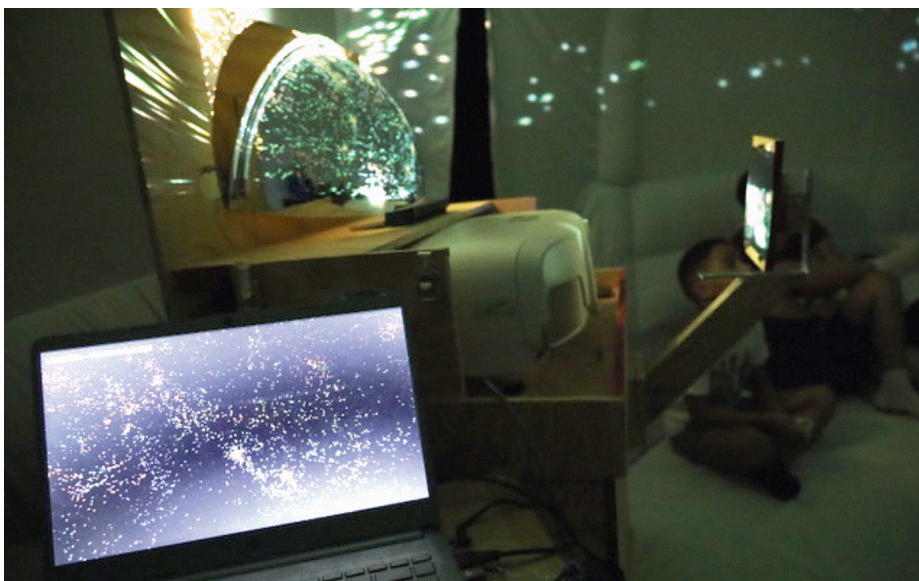


Figure 4: The first run of the SNAF mobile planetarium first run, including its projector and mirror. Image Credit: Fransisco Croes/Space and Nature Aruba Foundation

Biography

Space and Nature Aruba Foundation (SNAF) is a non-profit organisation based on the Caribbean island of Aruba. Its main goal is to bring astronomy and Earth science to the public through education, research, and public events to improve the status, understanding, and enjoyment of amateur astronomy and Earth science.