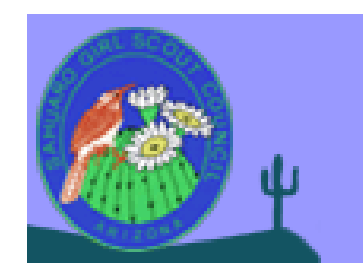


Astronomy Patch Day:

An Interactive Astronomy Experience for Girl Scouts

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Abstract

We present our planning and implementation of Astronomy Patch Day, a day-long interactive experience for Girl Scouts ages 5-18. Our first Astronomy Patch Day was March 19, 2005 and was a very successful event reaching about 150-200 Girl Scouts with ages from 5-18.

Motivation

To help encourage a new generation of women in science, the JWST/NIRCam project has partnered with the Girl Scouts USA nationally and the Sahuaro Girl Scout Council locally (see Poster PR18; D. McCarthy, Linking Girls to the Sky, for more information). To help address some omissions in the Girl Scout badge curriculum in astronomy, we have created several inquiry-based activities that promote various skills such as mathematics, classification, scale modeling, and scientific inquiry while learning about various astronomical concepts and career opportunities. To expose more Girl Scouts to these activities, we created Astronomy Patch Day where they would be able to experience these activities in a single setting with experts present.

Earth-Moon Scale Model: 10^7 light years

Participants create a scale model of the Earth-Moon system and contrast this with their preconceptions of the scale and build wearable take-home model.



Putting together the scale model of the Earth-Moon system.



Scale model of the Earth-Moon system. There are ~30 Earth diameters between here and the Moon.

Solar System Model: 10^5 light years

Participants create a scale model of the solar system with yarn based on a 1" sun. They can see relative distances in 2-D rather than just a linear progression.



Scale model of the solar system in yarn. Jupiter and the inner planets are shown here.

Stars – Graphing and Nucleosynthesis: 10^1 - 10^3 light years

Kinesthetic activity based on participants' own experience introducing concepts in nucleosynthesis, graphing, classification, and stellar astronomy.



Graphing stars on the HR diagram.



Making hydrogen into helium (see Poster PW25, P. Young, Two New Stellar Astronomy Outreach Activities)

Planning

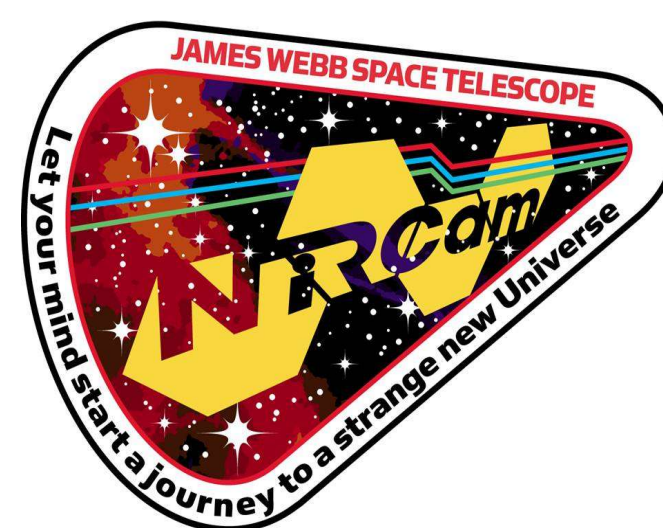
Astronomy Patch Day was held as part of the Sahuaro Girl Scout Council's annual Science, Math, and Related Technologies (SMART) program on March 19, 2005, in Tucson, Arizona. Over the course of several months activities were developed and volunteers recruited from University of Arizona faculty, post-doctoral researchers, graduate students, and trained local Girl Scout Leaders. Of nine activities developed for the program six were chosen. The activities were unified by the theme of "powers of ten" as the distance from earth of the primary subject of each activity increased.

Set up

Most of the activities can take place in a typical classroom, though the solar system modelling activity benefits from a larger space (or even outdoors). In order to maintain the unifying theme it is important to send groups through the activities in the proper order. At each station, informational signs were provided which had examples of female astronomers from each field and information on their careers.

Activities

Our six activities, taking a half hour each, spanned a wide range of topics and scales. To earn a patch, younger girls (ages 5-12) needed to complete 3 activities, while older girls (ages 13-18) had to complete all six activities. Most of the activities were accessible to all the ages present (ages 5-18), though the Universe activity, which required some prior knowledge of the events in the history of the universe to be ordered, was less accessible to the youngest ages (5-6 years). While the written program stated this activity to be for the older Girl Scouts, many troops did not see this.



Galaxy Classification: 10^6 light years

Participants develop their own classification schemes in a group setting and learn about astronomical classifications and the histories of galaxies which connects back to the Stars activity.



Classifying galaxies according to type based on structure and colors, while learning about star formation, dust, and gas properties of galaxies.

Testing/Feedback/Future

About 150-200 girls attended the Astronomy Patch Day portion of SMART. Feedback from participants was gathered in a formal way by evaluations handled by the Sahuaro Council as well as on our poster that girls were invited to write or draw one thing they learned or a question they had about astronomy (see image). Many girls ended activities saying "Wow! Science is fun!" and "Astronomy is cool!" They were very excited to learn new concepts such as how far away the Moon is from Earth (30 Earth diameters), what happens inside a star (hydrogen is made into helium), and how old the universe is (~13 billion years). The girls also were inspired to "Ask the Astronomer" many challenging questions including, "How did they create science?", "Why do spiral galaxies have a disk?", and "How long will the Milky Way last?" We received positive feedback from many Leaders on the quality and variety of the activities.

This school year, the Sahuaro Council is planning mini-SMARTs in outlying Southern Arizona communities where only a small number of presenters will be present. We will present 4 of our activities from Astronomy Patch Day at these events. In addition, we will hold Astronomy Patch Day every two years at SMART where we add/change a few additional activities to make it different for repeating attendees. In addition, the activities developed and tested at Astronomy Patch Day will be distributed to Girl Scout Councils across the country with the help of NIRCam and Astronomy Camp.

Acknowledgments

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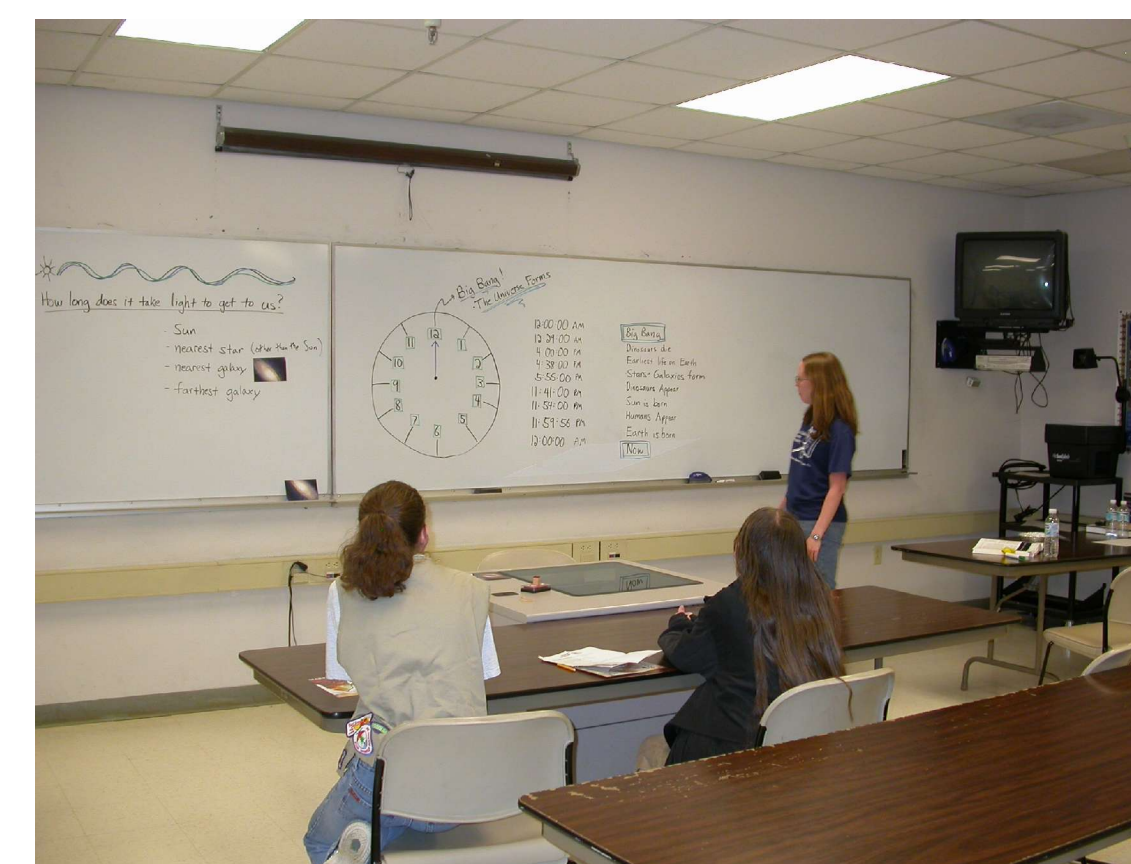
Ask an Astronomer: 10^{16} light years

Participants have unstructured time to interact with a real astronomer.



Universe: 10^9 light years

Participants learn about the scale of the universe both in time and space. With the Ultra Deep Field, they can connect back to the Galaxy Classification to see how galaxies evolve.



Cosmic Clock: If the history of the universe was only one day- humans would have been around 4 seconds.



Examining the Hubble Ultra Deep Field and talking about the early history of the universe.



Sheet where "Ask an Astronomer" questions and comments were written.