Universe of Learning Science Briefing: August 2017

The resources in this list pertain to the presentation given on August 3, 2017, titled, "Cosmic Beacons: 50 Years of Pulsar Discoveries".

------------------------------------------------------------------------------------------------------------------

NASA's Universe of Learning is a program which will integrate NASA's Astrophysics Science Mission Directorate programs, and will advance STEM learning and literacy by creating and delivering a unified suite of education products, programs, and professional development that spans the full spectrum of NASA Astrophysics.

NASA's Universe of Learning is partnering with the Museum Alliance to provide professional development briefings for the informal science education community. These briefings provide current NASA Astrophysics themes, content, and resources to the informal community. These curated lists present the resources described during the briefings. To find the briefings, you can go here: http://universe-of-learning.org/science_briefing

Supernova Educator Guide

Notes: The science specifically detailed in this guide involves multi-wavelength views of the dramatic explosion at the endpoint of the life of a massive star – i.e., a supernova. The individual activities within this guide are listed separately within NASA Wavelength, but you can find them all here. They are: Fishing for Supernovae, Crawl of the Crab, Magnetic Poles and Pulsars, and Neutron Stars in the News.

External Resource URL: http://xmm.sonoma.edu/edu/supernova/index.html

Activity: Magnetic Globe

Notes: This exercise is concerned with neutron stars. In fact, it deals with a specific kind of neutron star; one that spins rapidly and has a strong magnetic field. Such a neutron star is called a “pulsar." Participants will observe and draw magnetic field lines in two and three dimensions; construct a model of a pulsar and observe pulsations; and compare the geometry of their pulsar model to that of the Earth.

External Resource URL: http://xmm.sonoma.edu/edu/supernova/Eglobeactilitho.pdf

Fermi Launch Lithograph

Notes: This one-page lithograph describes the science of NASA's Fermi mission and the mission objectives. The lithograph includes a student activity to demonstrate how a pulsar generates the pulses of light that we see.

AAAS Benchmarks: 4A/H3

More info: http://nasawavelength.org/resource/nw-000-000-003-107

Resource URL: http://fermi.sonoma.edu/teachers/FermiLitho09pt.pdf

These external resources were not reviewed for the NASA Wavelength collection.
Universe of Learning Science Briefing: August 2017

Universe Discovery Guides

Notes: Universe Discovery Guides - January, February, July - The Universe Discovery Guides showcase education and public outreach resources from across more than 20 NASA astrophysics missions and programs. The January, February, and July guides all provide examples of stellar life and death, including illustrations of how massive stars may end up as neutron stars/pulsars. The January guide's theme is, "Betelgeuse, Red Giant Workaholic." The February guide's theme is, "Orion Nebula, Nursery of Newborn Stars." The July guide's theme is "Stellar Recycling."

AAAS Benchmarks: 4A/M1bc, 4A/M2de, 4A/H2ab, 4A/H2ef, 4A/H6
More info: http://nasawavelength.org/resource/nw-000-000-003-839

NASA Science Visualization Studio - Pulsar Animations

Notes: A pulsar is a rapidly rotating neutron star that emits pulses of radiation (such as X-rays and radio waves) at regular intervals. A millisecond pulsar is one with a rotational period between 1 and 10 milliseconds, or from 60,000 to 6,000 revolutions per minute. Check out several pulsar animations on the NASA Science Visualization Studio website.

External Resource URL: https://svs.gsfc.nasa.gov/vis/a010000/a010100/a010144/index.html

ViewSpace

Notes: ViewSpace is a self-updating multimedia astronomy display that uses internet-fed digital signage technology to provide a continually updated exhibit experience to patrons of informal education venues. It can serve as a supplement to existing science exhibits, or it can stand alone. Running on common, user-provided hardware, it is also incredibly cost-effective. There are pulsar shows on ViewSpace, including one titled, "In a Different Light: the Crab Nebula."

External Resource URL: http://hubblesource.stsci.edu/exhibits/self-update/viewspace/

NASA tumblr. — Five Famous Pulsars from the Past 50 Years

Notes: Check out the list put together by NASA of five particularly famous pulsars from the past 50 years.


These external resources were not reviewed for the NASA Wavelength collection.
Field Guide to X-ray Sources - Neutron Stars/X-ray Binaries

Notes: This field guide on the Chandra X-ray Observatory website describes how neutron stars emit high-energy radiation.

External Resource URL: http://chandra.harvard.edu/xray_sources/neutron_stars.html

Citizen Science: Einstein@Home

Notes: Einstein@Home is a program that uses your computer's idle time to search for gravitational waves from spinning isolated compact objects (among which are pulsars) using data from the LIGO gravitational wave detector.

External Resource URL: https://einsteinathome.org/

Crab Nebula

Notes: This Hubble Space Telescope image of the Crab Nebula (M1), one of the most studied objects in space, depicts the remains of a star that exploded as a supernova nearly a thousand years ago. The lithograph text describes the observational history of the nebula from its formation as a spectacular supernova explosion to its rediscovery over 700 years later and its distinction as the first pulsar discovered. The lithograph includes a classroom activity and an X-ray image taken by the Chandra X-ray Observatory.

External Resource URL: https://amazing-space.stsci.edu/resource_page/63/stars_stellar_evolution/topic#resource_tab

Crab Nebula Movie Animations

Notes: These series of movies of the Crab Nebula show pulsars to be dynamic and energetic. Hosted by the Chandra X-ray Observatory website.


Pulsar Animations

Notes: Pulsars are some of the most mind-boggling objects in our Universe, and they can be well made visible and audible in animations. In this website are the products and source files for some such general-use pulsar animations.

External Resource URL: http://www.astron.nl/pulsars/animations/
<table>
<thead>
<tr>
<th><strong>Notes:</strong> Explore the Doppler effect in a binary pulsar system by downloading &quot;Pulsating Science&quot;, an interactive 3D visualisation software. Generate, view, and modify binary pulsar systems and their radio pulsations.</th>
<th></th>
<th><strong>Notes:</strong> We are scientists working on the first-ever NASA mission dedicated to studying pulsars. Ask us anything!</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>External Resource URL:</strong> <a href="https://einsteinathome.org/science/pulsating-science">https://einsteinathome.org/science/pulsating-science</a></td>
<td><strong>External Resource URL:</strong> <a href="https://www.reddit.com/r/science/comments/6s5623/science_ama_series_we_are_scientists_working_on/">https://www.reddit.com/r/science/comments/6s5623/science_ama_series_we_are_scientists_working_on/</a></td>
<td></td>
</tr>
</tbody>
</table>