Stellar Evolution Webinar Transcript

Slide 1:

This presentation is an overview of the Stellar Evolution educational materials and supporting resources posted on the Chandra X-ray Observatory website. The materials were developed for classroom use as an astronomy unit, enrichment, or individual projects. Sections can be used as pre/post assessments as well. I will explain the separate sections during the presentation. These materials are also an excellent resource for Science Olympiad teams and coaches preparing for the space science events.

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These materials are part of NASA’s Universe of Learning; Astrophysics STEM outreach program. These materials were developed for the Chandra mission, and have been used extensively with formal and informal educators and for Science Olympiad clinics and workshops for the NASA Astrophysics Division via the Universe of Learning network and the Chandra X-ray Center Education & Communications Office, and its partnership with the National Science Olympiad.

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The Stellar Evolution materials are located at <http://chandra.harvard.edu/edu/formal/index.html>. They are accessed from the chandra.harvard.edu homepage under the Education menu and Classroom-Ready Activities and scrolling down to Stellar Evolution. This webinar is an overall introduction for the Stellar Evolution materials; three additional webinars will be recorded using the three card sets that are the basis for the activities.

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The Introduction and Background is a 13-page description of stellar evolution beginning with cold molecular clouds and star formation regions and progressing through to the various stages and end products that result from the evolution of different mass stars. Pages 1 and 3 are shown. Links are provided to websites with additional information for the images used in the Introduction and Background.

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The Interactive Guide to Stellar Evolution is based on the Stellar Journey with Chandra poster. A smaller version of this poster is available from the Chandra website. As you move the cursor over the Stellar Evolution poster the images on the illustration become live links and display the type of image – such as the Type II Supernova on the slide. Clicking on the object will produce a popup window of the image with a brief description of the object. Within the description is a live link to an actual Type II supernova image in the Chandra Photo Album. The strip along the bottom will show the different stages that the progenitor star evolved through before resulting in the Type II supernova event.

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There is an extensive Teacher Guide for using all versions of the Our Cosmic Connection activities – including using the background information, materials needed, classroom logistics, expected outcomes, a scoring rubric, supporting materials and resources, and links to NGSS as well as the National Science Education Standards and Benchmarks.

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The actual activity is a simple scenario that results in students putting a series of images in a sequence to represent the major evolutionary stages of different mass stars (mid-sized and massive) from formation through a Type II supernova event to their final end products; as well as in a sequence that produces a Type Ia supernova event. You can order these card sets online; as well as download the four pages of images as either a PowerPoint or as a PDF. There is also a flash version online where students can select a sequence – Type Ia supernova, A mid-sized star or a massive star and then drag and drop the images on the left into a sequence on the right side. Students then write a few words stating which evolutionary stage is represented by each image and it can then be printed out and brought to class or done during class time.

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There is also a webquest version of this activity that is also described in the Teacher Guide. The images from the card set are numbered and an active link is provided. The link takes students to a website of an object in the same evolutionary stage as the image shown. This gives students a chance to see two objects in the same evolutionary stage – many times a stage such as a Type II supernova can vary a widely from object to object. Students then make a list of the image numbers and their evolutionary stage. A template is provided so the students can use their list to place the images in order of either a Type Ia supernova event, a mid-sized star or a massive star. Students can be given an image set to paste into the space provided or they can draw the object.

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There is also a second set of images called Stellar Cycles. These can be used instead of the Cosmic Connection set with the same scenario. Or they can be used as a post assessment after the Cosmic Connection image set has been used in the classroom. This set also includes some light curves and H-R diagram images that can be used depending on the depth of content. Both the Stellar Cycles and Cosmic Connections image sets have an online description which includes the name of the object, the stellar evolutionary stage of the object, and a link to a website that gives a complete description of the object.

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The Stellar Evolution image set has been newly developed – specifically for National Science Olympiad coaches and teams. If you have a team or are presenting at a Science Olympiad Coaches Clinic or workshop please contact me and I will provide however many sets you need. Anyone can download the image set or order a classroom set if they want to use them. These images are more extensive and include light curves and H-R diagram images. This image set is not static and will change over time to incorporate images of new discoveries and observations.

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The Chandra website has a wealth of supporting materials for Stellar Evolution, including animations, images and podcasts.

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To request any of the infographics, lithographs or other materials go to <http://chandra.harvard.edu/edu/request.html> and follow the directions. If you want the supporting PowerPoint slide set that is used for this webinar presentation please email me at dlyoung.nso@gmail.com and I will send it to you. It has links in the slide notes section to the individual sections on the website.