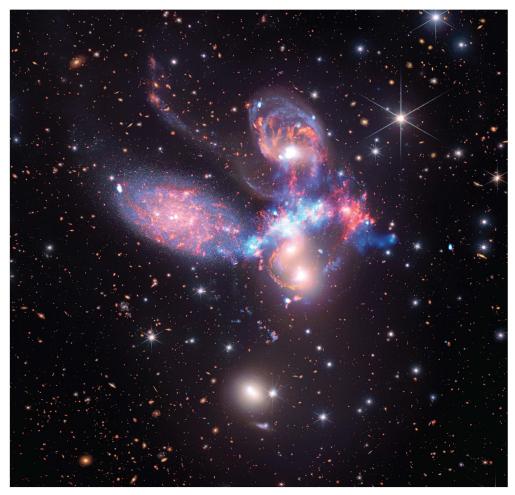# UNIVERSE OF CODE

SOFTWARE AND CODING

How do you make images of objects in space, particularly particularly those that are taken in kinds of light invisible to the human eye? Software and coding!

When telescopes like NASA's Chandra X-ray Observatory or James Webb Space Telescope capture data, they stream this data to back in Earth in the form of binary code. People use software to translate the ones and zeroes into various formats, including tables, plots and images.

What about the colors? The colors we see in the world around us are the result of the way that the human eye and brain perceive different wavelengths of light in the visible part of the electromagnetic spectrum. The human eye can't see X-rays, plus most other wavelengths including radio, infrared, ultraviolet and gamma-rays. To see these invisible wavelengths, we need instruments that are sensitive to those kinds of light.

Images from Chandra or Webb that include wavelengths of light invisible to humans are often called "representative color" images. That's because the colors applied to the images (using special software) are chosen to bring out important details. Color selection is used as a type of code, like a weather map. The colors can represent the intensity or brightness of the radiation from different parts of the image, or higher or lower energies from the object. Every space image is different, so read their captions to find out what the colors mean!

Scan the code to learn more!

Stephan's Quintet is a group of galaxies about 290 million light-years from Earth. This images shows data in infrared from the James Webb Space Telescope and Spitzer Space Telescope with X-ray data from the Chandra X-ray Observatory.

PEOPLE WHO CODE

Dr. Wanda Diaz is an astronomer and computer scientist who is helping to explore the Universe in new and innovative ways by converting scientific data into sound. She has been blind since she was a teenager and uses sonification to turn data from cosmic objects, including stars, into audible sound through physical properties like pitch and duration.

Christina Hernandez is an aerospace engineer at NASA's Jet Propulsion Laboratory where she worked as an instrument engineer on the Perserverance Mars rover and currently works as a systems engineer lead for NASA's Mission to Psyche.

Dr. Robert Hurt is an astronomer at Caltech/IPAC with a research background in star formation and galaxies. He has been the imaging lead for for a variety of NASA missions spanning the spectrum of light including the Spitzer Space Telescope, WISE, GALEX, and NuSTAR.

Jessica Mink, at the Harvard-Smithsonian Center for Astrophysics, works as Astronomical Software Developer, Data Archivist, and Positional Astronomer. She was part of the team that discovered the rings around the planet Uranus.