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[Notes:
1. The date preceding the title is the first presentation date.
2. The words in brackets after the presentation summary are keywords for the topics in the presentation. In general, "Astronomy" is a keyword for all of these presentations, but is not included in the list of keywords.
3. Some of these talks are also suitable for a general audience, and they are marked as such below.]

March 7, 2024 **A History of Imaging the Crab Nebula**

The Crab Nebula has been a part of human experience since 1054 AD. With the advent of the telescope, people began to image it, first by drawing what could be observed, then by visual photography, and finally in just about every part of the electromagnetic spectrum. Each image brought us closer to truly understanding this natural wonder. This presentation will discuss the long history of its imaging.

July 14, 2023 **Artificial Intelligence in Astronomy**

Join us for an illuminating presentation on the fascinating intersection of Artificial Intelligence and Astronomy! Our ~~expert~~ speaker will guide you through the latest developments in using AI to analyze and interpret astronomical data. You'll learn about cutting-edge techniques for identifying and classifying celestial objects, as well as ways that AI is helping astronomers to make new discoveries and push the boundaries of our understanding of the universe. Whether you're a seasoned astronomer or simply curious about the latest advances in technology and science, this presentation is not to be missed. Come and discover the incredible possibilities that arise when the power of AI meets the mysteries of the cosmos. Join us for "Artificial Intelligence in Astronomy" and witness the future of space exploration!
(The preceding description was written by ChatGPT in response to the prompt: write an advertisement for a presentation entitled "Artificial Intelligence in Astronomy".)
An exploration of AI, including how it's done and some examples.
[artificial intelligence, machine learning, deep learning, image analysis, symbolic regression, neural networks, big data, computational decision-making]

December 9, 2022 **Imaging Exoplanets by Looking Past the Sun**

Exoplanets, planets which orbit stars other than our own Sun, are plentiful in the universe. We can detect them, but we can't take pictures of them. This talk describes a project which proposes a telescope in deep space to image exoplanets by using the Sun as a gravitational lens. This is an ongoing NASA Innovative Advanced Concept (NIAC) called the Solar Gravitational Lens (SGL) mission.
[exoplanets, Sun, gravity lens, Einstein ring, telescopes, NASA Innovative Advanced Concepts, NIAC]

July 8, 2022 **The Variety of Cosmic Maps**

Maps of the cosmos exist in many different forms. Some are simply simulated pictures of the sky as observed from a certain place at a certain time. Others provide information about the cosmos in new and unique ways, using whatever two-dimensional layout best explains what we cannot see, from the smallest cosmic details to the entire observable universe. This presentation will show a collection of maps and the ways they educate us about our place in the cosmos.
[cosmos, maps, charts, artist renditions, infographics, points of interest, sky attractions, cultural differences]
[General audience: high school and older]

April 9, 2021 **The Arecibo Observatory: A Retrospective**
The Arecibo Observatory was a large radio and radar astronomy telescope. This talk will take a look back at the observatory—how and why it was built, how it's been used, what it achieved, how it was damaged, how it was dismantled, what is still left on site, and what may happen to the site in the future.
[Arecibo, observatory, radio, radar, hurricanes, telescope collapse]

November 13, 2020 **DIY: Make Your Own Spacecraft Models ... And Cookies!**
Building spacecraft can be a fun activity, using free materials provided by the national space agencies like NASA, ESA (European Space Agency), and JAXA (Japanese Aerospace Exploration Agency). It can also help you to learn about the spacecraft and its goals, see the layout of equipment, and visualize its operations, and involve others and inspire learning (for example, young people at home). This presentation shows how to find the models, how to build them, and even make some cookies.
[crafts, papercraft, spacecraft, satellites, star cookies, NASA, ESA]
[General audience: middle school and older]

September 9, 2020 **Underground Observatories -- "Seeing" the Universe Through Solid Rock**
Surprisingly, many astronomical observatories are deep underground, with no visual connection to the night sky. Instead of light, they search for more exotic particles. This presentation shows how they work and what they can "see".
[neutrinos, dark matter, underground observatories]

April 10, 2020 **Radio Astronomy at the MIT Haystack Observatory**
While on vacation, my wife and I have visited many astronomical observatories. Some of these have been dedicated to radio astronomy. This presentation describes a visit to the MIT Haystack Observatory in Medford, MA, and what we saw, heard, and learned while we there.
[radio astronomy, observatories, event horizon telescope, correlators, M87 black hole]

November 8, 2019 **NIAC: NASA's Exciting Innovation Funding Program**
Though NASA itself has had many bold and innovative ideas developed over the years, there are other places in the US that have people with innovative ideas--academia, corporations, and even garage inventors. NIAC (NASA Innovative Advanced Concepts) provides a way for those people to get encouragement and a little funding to develop ideas that are at the cutting edge of science and technology. This presentation describes NIAC and a few of its interesting projects.
[NIAC, NASA, cutting edge science and technology]

February 8, 2019 **'Oumuamua: Natural Object or Alien Probe?**
The object nicknamed 'Oumuamua is the first discovered interstellar visitor to our solar system. This presentation discusses the scientific and media controversy surrounding 'Oumuamua since its discovery.
[solar system, asteroids, comets, space probes, news media, controversies]
[General audience: high school and older]

September 14, 2018 **Are We Prepared For the Next Carrington Event?**
In 1859, a sunspot group spewed a coronal mass ejection from the Sun which hit the Earth, causing brilliant auroral displays and strong and damaging electrical currents in the only long-distance wires of the time: telegraph lines. This came to be called the Carrington Event, after the astronomer who first

described that sunspot group. What would happen to our modern, interconnected, fully-wired society if a coronal mass ejection as strong as the Carrington Event were to strike the Earth again?
[history, Sun, sunspot, aurora, electric power, natural disasters, public policy]
[General audience: high school and older]

November 10, 2017 **Curious Exoplanet Scientists Want To Know: Is There Life On Earth?**
Scientists are continually discovering new exoplanets, planets in other solar systems. Some of these exoplanets might be able to support life. Could imagined scientists on these exoplanets determine if there is life on Earth?
[exoplanets, alien life, observation, SETI (Search for Extraterrestrial Intelligence)]
[General audience: high school and older]

July 8, 2016 **Einstein Destroys Vulcan!**
In the 19th century, a French mathematician proposed that an undiscovered planet existed that orbited the Sun closer than Mercury in order to explain a problem with Mercury's orbit. Since it would be so close to the Sun, he called the planet "Vulcan". This presentation shows how Einstein's Theory of Relativity destroyed the need for planet Vulcan.
[history, mathematics, planetary orbits, Einstein, Relativity, Mercury, slide rules, computational astronomy, planet nine, controversies]

March 14, 2014 **The Machines of ALMA**
The radio telescope observatory in the Atacama high desert of Chile, the Atacama Large Millimeter/Submillimeter Array (ALMA), consists of movable radio telescopes and large vehicles to move them. Learn about these fascinating machines and how they're used.
[radio telescope array, Chile, Atacama high desert, vehicles, challenges]

September 13, 2013 **Optical Illusions and the Moon Illusion**
The Moon Illusion makes the Moon look larger at the horizon than when it is higher in the sky. Why does this happen and why are our eyes so easily fooled?
[optical illusions, Moon illusion, eyesight, optics, perception]
[General audience: middle school and older]

September 9, 2011 **The Antikythera Mechanism**
In 1901, off the coast of the small Greek island Antikythera, sponge divers discovered metal pieces on the seafloor amid the wreckage of an ancient ship. This presentation discusses how archaeologists eventually determined that these pieces were part of a previously unknown mechanical device which was an astronomical calculator. (Please note: The Antikythera Mechanism is an actual ancient astronomical calculator. It is NOT a “science fiction” device as shown in the movie “Indiana Jones and the Dial of Destiny”.)
[history, aquatic archaeology, ancient mechanical devices, computational astronomy]
[General audience: high school and older]

April 9, 2010 **The Pioneer Anomaly**
Pioneer 10 is an American spacecraft launched in 1972 to explore the planet Jupiter. As it traveled, NASA scientists noticed an anomaly: it was moving less quickly than expected. This presentation explores this scientific mystery and its eventual resolution.

[spacecraft, Pioneer model, anomaly, big data, mathematics, NASA, The Planetary Society]

August 14, 2009 **Relativity and the 1919 Solar Eclipse**
Einstein published his Theory of General Relativity in 1915. The 1919 solar eclipse provided one of the first tests of this theory. Learn about the problems and triumphs of this solar eclipse expedition, and how the observers helped to confirm Einstein's theory.
[history, solar eclipse, 1919, Einstein, Relativity, photography, star positions]

June 8, 2007 **My Top Ten 2006 "Astronomy Picture of the Day"**
In November, 2006, a reporter for a major newspaper put together his personal choice of the top ten pictures from ten years of images taken by the Hubble Space Telescope. I decided that these were not the ones I would have picked! This is a presentation of my own choices for the top ten pictures from NASA's Astronomy Picture of the Day (APOD) website for the year 2006.
[entertainment, astronomy images as art, NASA, APOD (Astronomy Picture of the Day)]
[General audience: middle school and older]

August 12, 2005 **Astro-Tourism: A Meridian Line in a Church in Rome**
When my wife and I traveled to Rome, we happened on an astronomical item in the Basilica of Our Lady of the Angels and Martyrs: a 300-year-old meridian line. This presentation describes the meridian line and how it was used to determine the exact length of the year and to compute the date for Easter Sunday.
[history, travel, tourism, religion, Easter, length of the year, meridian lines]
[General audience: high school and older]

August 9, 2002 **Updating Kepler's Dream: Observing the Earth FROM the Moon**
In 1608, Johannes Kepler wrote a book called "Somnium", which is Latin for "The Dream". In it he explored the idea of observing the Earth from the Moon in order to teach that the Earth is turning on its axis. Learn about the problems associated with this work, and what we now know about observing the Earth from the Moon.
[history, accusations, science education in the 1600s, Moon, Earth rotation]

April 12, 2002 **Stargazing for Everyone: Learn the Zodiac (Ecliptic Constellations)!**
The Zodiac, or Ecliptic Constellations, is the circle of animal-themed constellations that the Sun moves through during the year. This presentation will teach you how to memorize the placement of these constellations and how they can help you to orient yourself when observing the night sky in a dark location.
[ecliptic constellations, zodiac, mnemonic song, constellation images]
[General audience: middle school and older]

March 12, 1999 **Bad and Good Science in a Good Movie: "Deep Impact"**
"Deep Impact", a disaster movie from 1998, showed what Hollywood thought would happen if a large asteroid were to hit the Earth. Some of the events shown actually had a basis in science, though some were pure science fiction. This presentation will point out what was right and what was wrong.
[disaster movies, "Deep Impact", Hollywood movies, asteroid, science fiction, science in movies]
[General audience: high school and older]

April 9, 1993 **Computers in Astronomy: How We Know the Positions of the Planets**
Did you ever wonder how software apps can tell you when and where the planets are in the sky? This presentation presents a simplified view of the solar system which allows us to understand the calculations that produce the planetary positions.
[mathematics, planetary orbits simplified, computational astronomy, calculator]

August 9, 1991 **Mithraism, Astrology, and Precession**
Mithraism was an ancient religion which began in Persia and was popular with Roman soldiers. While it has died out, it left behind some temples and an intriguing image: a young man killing a bull. What does this image mean, and how is it related to astrology and the precession of the Earth's rotation axis?
[history, religion, archaeology, Mithraism, Astrology, tauroctony (killing a bull), precession of Earth's rotation axis]