

The Springfield Telescope Makers

Present

The Hartness House Workshop



Eclectic Astronomy



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Cover Photo: Stephan's Quintet, one of the first compact galaxy groups ever observed, in 1877, is 290 million light-years away. The bluish galaxy in the foreground is only 40 million light-years away. Credit: NASA, ESA, and the Hubble SM4 ERO Team

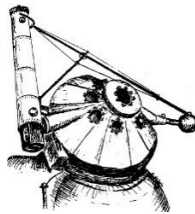


A special thanks to the Antique Telescope Society and Thomas Spirock for their generous contribution supporting the social hour.

**Hartness House Workshop
Chairman: Thomas Spirock
Co-Chair and Registrar: Dan Lorraine**

Hartness House Workshop, July 28, 2022

- 8:30 – 9:00 Registration, Breakfast and Coffee**
- 9:00 – 9:10 Words of Welcome**
Bob Morse, President, Springfield Telescope Makers
Thomas Spirock, Chairman, Hartness House Workshop
- 9:10 – 9:50 The Science of Solar Eclipses**
Jay Pasachoff, Williams College
- 9:50 – 10:30 Chasing Pluto: Occultation in the Outback**
Abigail Colclasure, MIT
- 10:30 – 11:00 Coffee Break**
- 11:00– 11:40 Who Put That Hole in the Telescope?**
Bart Fried, Antique Telescope Society
- 11:40 – 12:20 Imaging with the Hale Spectroheliograph at Stellafane**
Matt Considine, Springfield Telescope Makers
- 12:20 – 1:40 Lunch**
The Hartness/Porter Museum of Amateur Telescope Making is open
Matt Considine; STM Historian. RickHunter; tour docent.
- 1:40 – 2:20 MIT's Automated Observatory**
Tim Brothers, MIT
- 2:20 – 3:00 Bringing the Stars Home: Astronomical Advertising to Sell Goods**
Sara Schechner, Harvard
- 3:00 – 3:40 Threats to Astronomy: What's Out There, and What Are We Doing About It**
Doug Arion, Springfield Telescope Makers



3:40 – 4:10 **Coffee Break**

4:10 – 4:50 **Cataclysmic-Variable Science: The Rewards of Constant Vigilance**
Joe Patterson, Columbia

4:50 – 5:30 **Imaging Black Holes with the Event Horizon Telescope**
Nimesh Patel, Harvard

5:30 – 6:00 **Break**

6:00 – 7:00 **Cocktail Hour**

7:00 – 8:00 **Banquet**

8:00 – 9:00 **A Sky Full of Poems**
Dava Sobel



Abstracts and Biographies

Jay Pasachoff – The Science of Solar Eclipses

Abstract: I will describe the most recent solar eclipses my team and I have observed, with emphasis on the December 4, 2021 (from an airplane near Antarctica and from the ice); July 2, 2019 (from Chile, from the centerline and from the Cerro Tololo Inter-American Observatory); and August 21, 2017 (from Salem, Oregon), total solar eclipses. I will stress our science goals and our observing methods and capabilities. I will include some eclipse history and future total solar eclipses from the United States (2024, 2045, and 2079). My current eclipse-research support is from the Solar Terrestrial Program, Atmospheric and Geospace Sciences Division, National Science Foundation. Recent eclipse colleagues include David Sliski, Alan Sliski, and Aris Voulgaris, as well as Williams College students.

Bio: Jay Pasachoff is Field Memorial Professor of Astronomy at Williams College and Chair of the International Astronomical Union's Working Group on Solar Eclipses. He is a veteran of 75 solar eclipses, including 36 total solar eclipses. He saw his first solar eclipse as a 16-year-old first-year Harvard student as a member of a Freshman Seminar, no doubt admitted to Harvard from the Bronx High School of Science in large part because of his making a telescope (including grinding and polishing its mirror) under the supervision of the Optical Division of the Amateur Astronomers Association (New York) in the basement of the Hayden Planetarium, and participating in Moonwatch observing. His Ph.D. at Harvard was for studies of the solar chromosphere, and his first postdoctoral appointment was as Menzel Research Fellow at the Harvard College Observatory to work on the 1970 total solar eclipse. He was then a postdoctoral fellow for two years at Caltech, with appointments at the Hale Observatories (Mt. Wilson and Palomar) and the Big Bear Solar Observatory. He went to Williams College in 1972 and has just completed his 50th year of teaching there. He is author and co-author of a major survey textbook in astronomy, most recently co-author (with Alex Filippenko) of the fifth edition of *The Cosmos: Astronomy in the New Millennium*. He is author of the fourth edition of the *Peterson Field Guide to the Stars and Planets* and co-author of the new *Peterson Field Guide to Weather*. His work on the overlap of astronomy and art history has led to his being co-author (with Roberta J. M. Olson) of *Cosmos: The Art and Science of the Universe*. He received the 2003 Education Prize of the American Astronomical Society, the 2012 Prix-Jules-Janssen of the Société Astronomique de France, the 2017 Richtmyer Memorial Lecture Award, American Association of Physics Teachers, and the 2019 Klumpke-Roberts Award from the Astronomical Society of the Pacific. Asteroid 5100 Pasachoff is named after him.

Abigail Colclasure – Chasing Pluto: Occultation in the Outback

Abstract: Since the discovery of Pluto's atmosphere using a stellar occultation in 1989, occultations have been an active area of research. Occultations occur when Pluto, or another body, passes in front of a star, blocking the incoming light. The resulting lightcurve can be used to probe the atmosphere and provide data rivaling that of a spacecraft. Not only can an occultation indicate whether or not an atmosphere is present, it can also be used to determine characteristics such as atmospheric temperature, pressure, and composition. Occultation work

is particularly timely now due to the 2015 New Horizons flyby and Pluto's orbital position. Data from New Horizons improved the accuracy of occultation predictions and provides a benchmark from which new measurements can be made. As Pluto approaches the aphelion of its highly eccentric, nearly 250 year orbit, it is uncertain whether or not its atmosphere will completely freeze over; current work is focused on answering this question. On June 1, 2022, Pluto occulted a particularly bright (13th magnitude) star. Observations were made in Australia and promise new insight into Pluto's icy world.

Bio: Abigail Colclasure is a rising third year undergraduate student in MIT's physics department. She works at MIT's Wallace Astrophysical Observatory and studies small solar system bodies, namely Pluto and Koronis family asteroids. Whether it is remote observing from her childhood home or chasing stars in Australia, she loves all things astronomy and is always happy with a telescope.

Bart Fried – Who Put the Hole in the Telescope?

Abstract: The development of the world's most accurate timepiece. In the history of astronomical observatories, few if any have been more important in the development of precision timekeeping than Greenwich Observatory and the United States Naval Observatory. Both are rooted in providing star charts, tables and improved methods of keeping time to aid Maritime navigation. In many ways both observatories have been at the forefront of the "culture of precision" and the establishment of professionalism in astronomy well before the advent of 'The New Astronomy' which we call Astrophysics. And while the astrometric and theoretical work done at both places has been the focus of their early existence, other problems were being studied concurrently. The recent discovery of an extraordinary and completely forgotten telescope artifact has cast new light on one of those other problems, the astrometric and geodetic problem of the seemingly random Variation of Latitude – a problem that plagued all observatories of the past. It would take the better part of a century and the development of highly specialized and exceptionally precise telescopes for astronomers to complete the puzzle of this short-term variation ... this wobble of the Earth's axis of rotation. And in the end, these telescopes, designed for astrometric observations to solve what is essentially a geodetic problem, also proved to be the world's most accurate timepieces. This talk will discuss the problems and the evolution of these unusual telescopes; the theory that led to the solution of the Variation of Latitude, and the step-by-step developments that led to their change of purpose to that of timekeeping.

Bio: Bart Fried is founder and a past President of the Antique Telescope Society; Executive V.P. of the Amateur Astronomers Association; past Board member of Custer Institute & Observatory and a member of four other amateur astronomy organizations. He is a scholar specializing in the history of the telescope, and the life and work of the famous telescope maker, Dr. John Alfred Brashear. At other times, he skis, scuba dives and rides his bicycle.

Matt Consodine – Imaging with the Hale Spectroheliometer at Stellafane

Abstract: This presentation will be an update on the imaging workflow being done with the Hale spectroheliometer at Stellafane. Particular attention will be given to the leveraging of work done by amateurs in France.

Bio: Matt Consodine is a member of the Springfield Telescope Makers and Treasurer of the Antique Telescope Society. Along with Jim Daley and Dave Groski, he has worked to restore, install and make operational the 1930's-era spectroheliometer now running in the Simoni observatory at Stellafane. He has been primarily concerned with fine tuning the visual capabilities of the instrument, as well as with developing an imaging workflow that helps support the mission of the Springfield Telescope Makers and the annual Convention.

Tim Brothers – MIT's Automated Observatory

Abstract: As we turn the page on MIT Wallace Astrophysical Observatory's first 50 years, Tim will reflect on the rich history of innovation in telescope automation, astronomical education and observation at the observatory. Various automation software packages will be compared to see what fits best with our future education, science and public outreach missions. Then, we look forward at plans to clean the slate and rebuild the observatory from the ground up to meet the challenges of the next half century. One of these challenges, light pollution, is incredibly urgent, but hope is not yet lost. We will conclude with some recent successes in combatting light pollution that we hope you can take with you to replicate in the community surrounding your observatory.

Bio: Tim Brothers is the Observatory Manager at MIT's Wallace Astrophysical Observatory and a Technical Instructor in the Department of Earth, Atmospheric and Planetary Sciences at MIT, where he teaches undergraduates how to operate robotic telescopes and collect scientific data on a wide variety of targets. He is also the co-founder and Vice President of the Massachusetts Chapter of the International Dark-sky Association, where he leads policy efforts in legislative affairs and drafting a new Model Lighting Ordinance. Tim also enjoys spending time with his family on his rural homestead in Massachusetts.

Sara Schechner – Bringing the Stars Home: Astronomical Advertising to Sell Goods

Abstract: Celestial bodies have long evoked wonder, and many companies took advantage of the symbolism of astronomy and its instruments to market their products in the 19th and 20th centuries. D-Zerta drew on the anticipated return of Comet Halley in 1910 to launch its new pudding. Excitement over the opening of the world's largest telescope in 1949—the 200-inch telescope at Palomar Observatory--was used to sell Buicks and bread. This talk will focus on the diverse ways that images of astronomical instruments—especially sundials and portable telescopes—were used to sell consumer goods and lifestyle choices. The advertisements for goods and services unrelated to astronomy fall into three categories. Victorian trade cards often had romantic, comic, or historic images to catch the eye of consumers who would take and share the cards that promoted food stuffs, farm tools, patent medicines, local haberdashers and other businesses. The second group of advertisements (mostly found in magazines) associated a

characteristic of the depicted scientific instrument with the product. For example, an astrolabe might be associated with the complexity and usefulness of a typewriter; a sundial with the time-tested endurance of a refrigerator, a shoe for every hour of the day, or cocktails for those happy hours; or a telescope for the search and discovery of sexy underwear or the best motor oil. The third group drew upon the spectacle and romance of stargazing to suggest that the product would delight the consumer with an out-of-this-world experience be it through Life Saver candy or plush carpet. I will also exhibit a fourth category of advertisements that promoted the purchase of telescopes to amateur astronomers by placing attractive women next to them.

Bio: Sara J. Schechner, Ph.D. is the David P. Wheatland Curator of the Collection of Historical Scientific Instruments and a Lecturer on History of Science at Harvard University. Her research, teaching, and exhibitions have earned her many prestigious international awards, including recognition as a Legacy Fellow of the American Astronomical Society (AAS). She is currently the president of the Inter-Union Commission for History of Astronomy of the International Astronomical Union (IAU) and the International Union for the History and Philosophy of Science and Technology (IUHPST). She is a founding member of the AAS Working Group for the Preservation of Astronomical Heritage, Vice President of IAU Commission C3 (History of Astronomy), and on the editorial board for Journal for the History of Astronomy. Her books include *Comets, Popular Culture, and the Birth of Modern Cosmology* (1997), *Tangible Things: Making History through Objects* (2015, with Laurel Thatcher Ulrich et al.), and *Time of Our Lives: Sundials of the Adler Planetarium* (2019). Current research focuses on sundials, science, and social change; the representation of astronomers and their instruments in works of art; and scientific instrument making in America.

Doug Arion – Threats to Astronomy: What’s Out There, and What Are We Doing About It

Abstract: Satellite megaconstellations. LED and commercial lighting. Radar and radio interference. Space crowding and space debris. All of these represent challenges to doing astronomy, both from Earth and in space. What is the professional astronomy community doing to address these issues? How can we protect astronomy for the future?

Bio: Douglas Arion, PhD is the founder of Mountains of Stars, a public science outreach and education program that engages the public with ‘environmental awareness from a cosmic perspective’. He is Professor Emeritus of Physics and Astronomy and Donald D. Hedberg Distinguished Professor Emeritus of Entrepreneurial Studies at Carthage College. Previously, he was assistant vice president and head of the Applied Physics and Engineering Division of Science Applications International Corporation. He, with Richard Fienberg, co-founded Galileoscope to provide high quality, low cost telescopes for worldwide promotion of science education and outreach as part of the International Year of Astronomy 2009 and International Year of Light 2015. More than 260,000 are now in use in over 110 countries.

Arion is a Fellow of the American Physical Society, a member of the American Astronomical Society (AAS) and the International Astronomical Union, has received the Distinguished Service Award from Sigma Pi Sigma (the physics honorary society), the Volunteer Leadership Award from the Appalachian Mountain Club, and the Dark Sky Defender Award from the International

Dark Sky Association. He has conducted research in many fields, including the solar atmosphere, radiation effects on electronics and space systems, and asteroid compositions.

Joe Patterson – Cataclysmic-Variable Science: The Rewards of Constant Vigilance

Abstract: Cataclysmic variable stars are among the most fascinating in the Galaxy, and readily observed with amateur telescopes. During the last 30 years, we have kept watch over them with a worldwide network of mostly amateur observers: the Center for Backyard Astrophysics (CBA). The CBA has discovered new aspects of their famous explosions (novae and dwarf novae), which have led to new theories of how they form, live, and die. I'll discuss highlights of how we've managed to move this enterprise along.

Bio: Joe Patterson is professor of astronomy at Columbia, having migrated from history of science during the 1970 solar eclipse. He studies eruptive variable stars, and operates the Center for Backyard Astrophysics, a worldwide network of observers/telescopes doing time-series photometry (cbastro.org).

Nimesh Patel – Imaging Black Holes with the Event Horizon Telescope

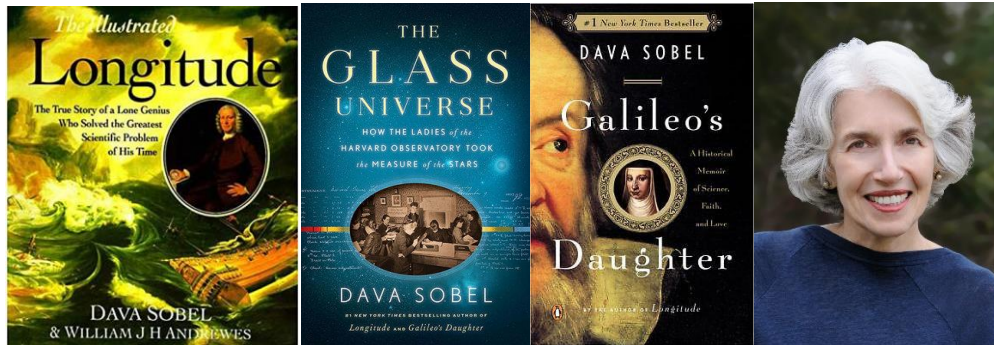
Abstract: The Event Horizon Telescope (EHT), a network of radio telescopes spread across the globe, has imaged for the first time, the shadow of two supermassive black holes. The first image of the black hole at the center of the galaxy M87 was published in April 2019, followed by the image of the SgrA* black hole at the center of our own Galaxy, announced recently in March 2022. These are the among the highest angular resolution images ever made (~20 microarcseconds), enabled by the technique of Very Long Baseline Interferometry (VLBI). In this talk, I will summarize the EHT experiments, describe the VLBI method, present the results in the astrophysical context ("What can we learn from these images?"), and discuss the future plans on the development of the Next Generation EHT, which will allow us to make movies of these black holes and also make it possible to observe more distant sources.

Bio: I am an astrophysicist and a project engineer working for the Submillimeter Array, since 1994, and the Greenland Telescope, since 2012. My research interests include molecular astrophysics, evolved stars, interstellar medium, star-formation and astrophysical masers, radio interferometry, high-speed analog to digital conversion, antenna pointing and metrology. I am an instructor for the Harvard undergraduate laboratory astrophysics course, Astronomy 191. I am involved in the development of various educational projects for 21 cm wavelength radio astronomy. I am a member of the Event Horizon Telescope (EHT) collaboration and participating in the development of the Next Generation EHT.

Dava Sobel – A Sky Full of Poems

Abstract: Both professional and amateur astronomers, as well as stargazers of all cultures throughout history, have been inspired by their night visions to write poetry about the cosmos. This presentation will include discussion and readings of poems about eclipses, planets, stars, spacecraft, and, of course, telescopes.

Bio: Science writer Dava Sobel is the author of *Longitude*, *Galileo's Daughter*, *A More Perfect Heaven*, *The Planets*, and *The Glass Universe*. She also edits the monthly "Meter" poetry column in *Scientific American* and is at work on a new book about Marie Curie's laboratory.



Dava observing the transit of Venus from Mt. Wilson Observatory

