

The Springfield Telescope Makers

Present

The Hartness House Workshop

Advanced Telescope Making

Thursday August 1, 2019



Photo Mike Hayes

Advanced Telescope Making

Welcome to the historic Hartness House Inn

The Hartness House Inn was built by James and Lena Hartness in 1904. During their time in the home, they hosted many influential guests (including Charles Lindbergh!). James Hartness served as the state of Vermont's governor from 1921 – 1923. After their passing, the property was purchased by three local machine tool companies who continued to host their guests at the home.

In 1954, the first addition and Victorian Ballroom were added to the home to house more guests and create the Hartness House Inn. In 1968, the Governor's Room was built, adding a restaurant to the property. In 1971 the final addition was added to the Inn, which included 24 guests rooms. The Hartness House was then put on the National Register of Historic Places. In 2004, the Hartness House celebrated its Centennial Anniversary!

Nine years later, the Inn was purchased by passionate owners who were ready to invest in needed renovations and updates. Work began on the building's infrastructure and the rooms in the wings. Next, the Governors Room underwent a total renovation, creating The Tavern for guests and the local community.

A special thanks to the Springfield Telescope Makers Leadership Team and the Workshop organizers:

Jeff Lowe, President

Francis O'Reilly, Vice President

Jay Drew, Secretary

Glenn Jackson, Treasurer

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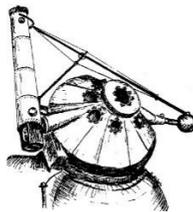
Dr. Thomas Spirock, Workshop Chair

Daniel W. Lorraine, Workshop Co-Chair & Registrar



Hartness House Workshop, August 1, 2019

- 8:30 – 9:00 Registration and Coffee**
- 9:00 – 9:10 Words of Welcome**
Jeff Lowe, President, Springfield Telescope Makers
Tom Spirock, Co-chairman Hartness House Workshop
- 9:10 – 9:50 Building a Schupmann Telescope**
Clif Ashcraft
- 9:50 – 10:30 Lens Design, Then and Now**
Don Dilworth
- 10:30 – 11:00 Coffee Break**
- 11:00– 11:40 Bigger, Lighter, and Cheaper Mirrors**
Normand Fullum
- 11:40 – 12:20 Interferometry for Amateur Telescope Makers**
William Zmek
- 12:20 – 1:40 Lunch**
- 12:20 – 1:40 Hartness/Porter Museum of Amateur Telescope Making open**
Bert Willard, Curator
- 1:40 – 2:20 Next Generation of Optical Coatings for Astronomical Observatories and the Space Program**
Anthony Pierra
- 2:20 – 3:00 New Life for Old Telescopes**
Dan Gray
- 3:00 – 3:40 Is sCMOS Really sCMAS?**
Gary Walker



3:40 – 4:10 Coffee Break

4:10 – 4:50 Writing on Sand: Will This be the Last Generation of Telescope Makers
Perry Remaklus

4:50 – 5:30 A New Era of Professional-Amateur Collaboration in Astronomy
Richard Fienberg

Bio: Dr. Rick Fienberg is Press Officer of the American Astronomical Society (AAS) and President of International Astronomical Union (IAU) Commission C2, Communicating Astronomy with the Public. Earlier he spent 22 years at *Sky & Telescope* magazine, the last eight as Editor in Chief, and one year teaching high-school astronomy at Phillips Academy in Andover, Massachusetts. He's a Fellow of the American Association for the Advancement of Science, and the IAU has named asteroid 9983 Rickfienberg in his honor. He is co-creator of the Galileoscope educational telescope kit, a Cornerstone Project of the International Year of Astronomy 2009 and the International Year of Light 2015. Before joining *S&T*, Rick earned his BA in physics at Rice University and his MA and PhD in astronomy at Harvard University. He has done research on the aurora borealis, asteroids, planetary nebulas, active galaxies, and the center of the Milky Way. Though trained as a professional astronomer, Rick remains an amateur at heart, observing the sky and taking astrophotos from his hilltop observatory in central New Hampshire. An inveterate traveler and eclipse-chaser, he has visited all seven continents, sailed the seven seas, and reached both the North and South Poles.

Abstract: No PhD? No problem! Astronomy is one of the rare fields in which amateurs can make significant scientific contributions. There are only about 20,000 professional astronomers worldwide, and the observers among them typically get no more than few nights of competitive telescope time per year. In contrast, amateur astronomers number in the hundreds of thousands and can use their telescopes as often as their schedules (and the weather) permit. Many observe the sky just for fun, but others use their skills — and their increasingly advanced instruments — to help enhance our understanding of the universe in collaboration with professional astronomers. Moreover, the Internet has made it possible for large numbers of “citizen scientists” to gain access to large astronomical databases and apply their eyes and brains to data-analysis tasks that professionals haven't yet figured out how to automate. All of this has completely transformed the nature of pro-am collaboration in astronomy. In this presentation we'll explore how pro-am collaboration has evolved over the past century, review some of amateurs' most significant contributions to modern astronomy, and consider where pro-am collaboration may be headed.

5:30 – 6:00 Break

6:00 – 7:00 Cocktail Hour

7:00 – 8:00 Banquet

8:00 – 9:00 **Amateur Astronomy: The Next Twenty Years**

Richard Berry

I've been an active amateur astronomer for more than fifty years, so forecasting the next twenty might seem easy. But it's not. Back in 1964, I doubt anyone would have foreseen the SCT Revolution (a disruptive technology), the Dobsonian Revolution (a shift of mind-set), or the advent of amateur CCD Imaging (another disruptive technology). Some things we could have foreseen: missions to the outer planets as extrapolations of lunar probes. But the Internet's pervasive social effects--no way! Nevertheless, I will pose a few logical extrapolations, make a few wild guesses about disruptive technologies, and speculate on possible Black Swan events.

Richard Berry: The Last 50 Years

As an undergraduate at the University of Virginia, my declared major was astronomy, but as a student, I was not the best. I survived the required physics and math classes, took electives in geology and anthropology, got interested in architecture (for a time considered switching majors), and finally graduated with a B.A. in astronomy. During the school year, I took the train from Stamford station to Charlottesville...and Eleanor von Auw often took the same train to Bryn Mawr, so we kept bumping into each other. One Christmas break, I invited her to go ice-skating, but she had a paper to write. In the spring I showed up (unannounced) at her dorm, and that set us on a course. We went all over New York while she was living there.

After graduation, job prospects were few. Technically, I suppose that Eleanor and I eloped, since we didn't tell anybody until after the fact. We moved to Toronto, where I got a job in an agricultural coop making herbicides, and we scraped along. My lucky break was landing a job at York University. My practical experience making telescopes and doing spectroscopy in the basement (while I was at Rippowam) seems to have been good preparation for designing research rocket payloads!

Since I was working at a university, it was relatively easy to shift into graduate school despite my less-than-stellar undergraduate grade-point average. I studied astronomical photoelectric photometry and earned a Master of Science (MSc). The dissertation was the first major writing project I had undertaken, and – with Eleanor's help and prodding – I learned how much I enjoy organizing and presenting ideas. My subsequent career owes a lot to writing that dissertation.

After that I became the "Reliability and Quality Control Officer" for a small high-tech start-up formed by one of the professors at York, to build flight-certifiable lamps for the Ultraviolet Absorption experiment (MA-059) flown aboard the Apollo-Soyuz Test Project. Then I joined a research group at McMaster University measuring O₃ and H₂S from the local steel-mills by shining a laser beam across the city.

At that point, jobs in science research dried up. One day I noticed a new magazine called ASTRONOMY in the store of the McLaughlin Planetarium. I bought a copy, and then noticed they were looking for a Technical Editor. I figured, "Heck, I've been an astronomer all my life. I've got a solid technology background, I worked for the college newspaper so I have a smattering of journalism, and I write well under tight time constraints and pressure. Magazine editing ought to be easy." A year after I sent in my application, I was invited to Milwaukee for a job interview – and I got the job.

After a couple years, my role morphed into Editor and then into Editor-in-Chief. I managed the staff, went to meetings of professional astronomers, and persuaded

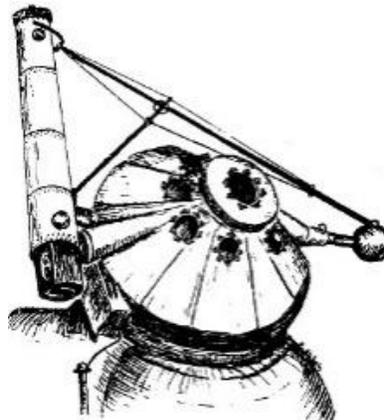
astronomers who gave interesting talks to write articles for ASTRONOMY. I also went to meetings where amateur astronomers gathered and figured out what they wanted to read in the magazine. While I was at ASTRONOMY, I also founded and edited Telescope Making, a special-interest journal devoted to the community of amateur telescope makers.

After 16 years in editing, I left ASTRONOMY to begin writing full time at home. This enabled Eleanor to secure a faculty position in Salem, Oregon, and we moved from rural Wisconsin to rural western Oregon to a place with eight acres and a barn. I have since written and coauthored a string of books about telescope design, astrophotography, and image processing. I've given lots of talks and been invited to workshops and conferences in England, El Salvador, Australia, Guatemala, Iran, and South Africa. My first book – Build Your Own Telescope – grew from my experience as a teen-age telescope maker. After that, I dove into writing The CCD Camera Cookbook, a book about building a super-sensitive computer-controlled digital camera for about \$350 in parts. My publisher refers to the 750-page Handbook of Astronomical Image Processing as “Richard’s tombstone.” The book includes software that converts raw image data into precise measurements or beautiful celestial color pictures.

In the meantime, I coauthored two more books: The Dobsonian Telescope, A Practical Manual for Building Large-Aperture Telescopes, and Telescopes, Eyepieces, and Astrographs: Design, Analysis, and Performance of Modern Astronomical Optics. Their lengthy subtitles describe the contents well.

We're still living on our 8-acre place with two cats. Eleanor writes poetry, and exercises her organization skills in a variety of ways; she is a former President of the National Federation of State Poetry Societies, and has served as President of the Oregon Poetry Association. I am currently second vice-president of the AAVSO, and served a couple terms as President of NightSky45, the Salem astronomy club. We now have three alpacas that we shear every year for their fleece (we currently have 250 skeins of wonderfully soft alpaca yarn for sale). We grow hay on four of our eight acres to feed the alpacas, and my observatory is out in the middle of the alpacas' pasture.

9:00 – 11:00 Viewing through the historic Hartness Turret Telescope, featuring a 10” Brashear Objective Lens
Session Director Paul Valleli



A Brief History of Stellafane **by Bert Willard**

Springfield Telescope Makers Club Historian



Russell Porter drawing, chalk on blackboard,
of the Clubhouse, done December 7, 1923

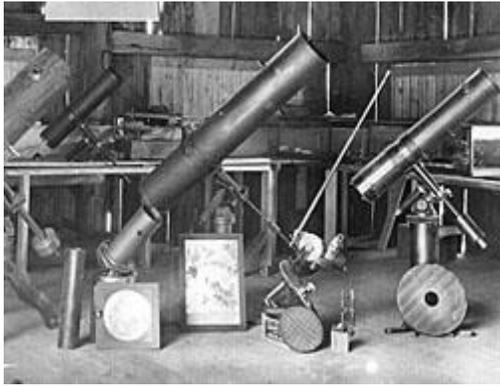
High on a hilltop in southern Vermont, backed against a southern shield of tall spruce trees and facing north to Mount Ascutney is an astronomical observatory. It is the home of the Springfield Telescope Makers, the oldest group of amateurs in the country devoted to building and using astronomical telescopes and other scientific instruments. Stellafane, as the clubhouse is called, is a monument to Vermont inventiveness and a cornerstone of a hobby which sprang from fertile Yankee minds and spread throughout the country. The hobby became instrumental in creating the present public interest in astronomy and space exploration.

It all began on August 17, 1920 when fifteen men and one woman signed up to learn how to grind their own mirrors and make powerful reflecting telescopes. Most of the men were machinists, tool makers or pattern makers at the Jones and Lamson Machine Company in Springfield. The lone woman was a school teacher.

Their instructor, Russell W. Porter, was well prepared to guide them through the demanding though rewarding steps which required them to work to accuracies one-thousandth as large as they were used to in their daily precision machine work. Porter had spent years on the Maine coast teaching himself the art and science of building telescopes. This practically nonexistent hobby he took up to satisfy a drive which had slowly grown during his eleven years as an arctic explorer with Perry, Cook, Fiala and others. That drive was to learn more about astronomy.

After successfully completing their telescopes and using them for a while to explore the wonders of the universe the men decided to build a hilltop observatory and form an official club. On December 7, 1923 the first official meeting of the Springfield Telescope Makers, Inc. was held. Their clubhouse, Stellafane, was completed soon after.

From the very beginning the club attracted the interest and support of James Hartness, first as president of the Jones and Lamson Machine Company and then as Governor of Vermont (1921 - 1922). Hartness had earlier encouraged and financed Porter's telescope making struggles in Maine and had made his own amateur observatory, the world's first refracting turret telescope, still to be seen today at the Hartness House in Springfield.



Club Telescopes & Mirrors on display at a 1922 County Fair



A scene from the 1927 Convention

Other luminaries sought refuge from daily drudgery among the simpler astronomical pursuits at Stellafane. Ralph E. Flanders, who later became a senator from Vermont, was a member from the beginning. Later Joseph B. Johnson joined the club. Even after serving as governor of the state he has never lost interest in the club activities to this day.

In 1925 an Editor of the "Scientific American" magazine, Albert G. Ingalls, heard about the small band of men building telescopes in Vermont and came up to investigate. He had been struggling with his own telescope and was eager to learn if there was any interest in building telescopes among his readers. During his visit to Stellafane he gathered enough information to run two articles with much of the material and illustrations contributed by Porter. The response was so great that Ingalls soon started a regular department devoted to amateur telescope making. Porter became a contributing editor. Throughout the 1920's the urge to build telescopes continues to spread across the United States and even to foreign shores. The move has helped to create a lasting foundation of public interest in observational astronomy. In recent years this had led to the growing attendance at planetariums and to the intense interest in space exploration.

In 1928 Porter was invited to join the staff of scientists and engineers being assembled to design the world's largest telescope, the 200-inch, to be erected at Palomar mountain. His abilities as artist, optical designer, mechanical designer and architect proved invaluable to the entire task which had never before been undertaken. Soon after Porter left Springfield to work on the 200- inch telescope a second Stellafane member, Oscar S. Marshall, joined him as a skilled machinist to work in intricate counterweights, drive gears and the like. The Springfield Telescope Makers is the only

amateur organization to boast two of its members having worked on the world's largest optical telescope.

Under the leadership of Porter, the club members completed the construction of a large sixteen-inch reflecting telescope in 1930. Inspired by the success of Hartness' telescope to shelter the observer from the cold winter nights, Porter had borrowed the idea of the turret and modified it for a reflecting telescope. It stands today as the world's only reflecting turret telescope and is the envy of countless observers with its recently refurbished optics, rock solid mechanics, sheltered viewing room and, of course, the unpolluted black Vermont sky.

Since the 1920's, except during World War II, annual conventions have been held in the summer at Stellafane. These are weekend gatherings when amateurs come from all over the country to compare telescopes they have built and glean fresh ideas from guest speakers. Today the number of attendees reaches nearly a thousand and the web of influence reaches as far as California and Canada. It is an important addition to the American scene. Countless amateurs have been so overwhelmed with the hobby that they have taken up optics as their career. Even more have simply gained immensely from a satisfaction in sharing a rewarding hobby.

Stellafane continues to be an active hilltop observatory today. Its influence goes beyond Springfield or even Vermont. It provides inspiration, guidance and leadership among the amateur astronomy community as it did during the 1920's and 1930's. It is a landmark unique to the country and Vermont can be proud of heritage she harbors in the Green Mountain Observatory.



Be sure to read Bert Willard's *The History of Stellafane 1921-1989* on the Stellafane website. There are four chapters:

- *The Heavens Declare the Glory of God 1921-1928*
- *Leo Scanlon, 1930 and 1937 Conventions*
- *Stellafane Decline and Renaissance 1937 – 1989*
- *Mac's Mack Club (1950's)*



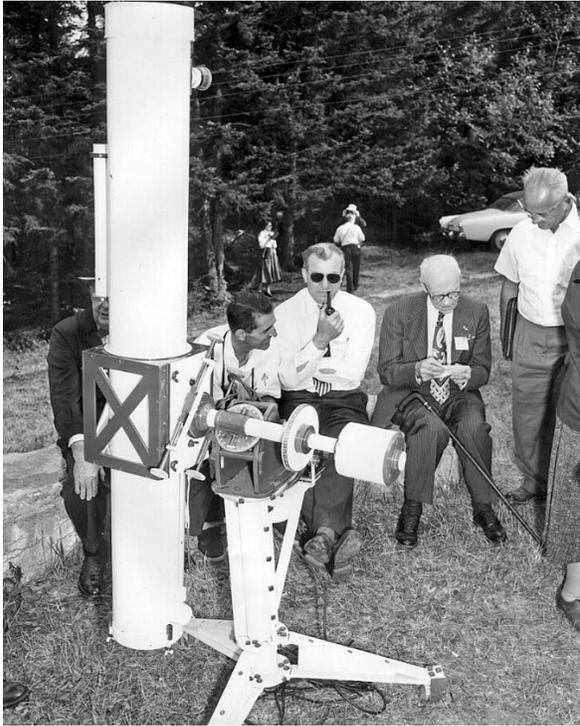
Stellafane: The Hot Bed of Innovation in Amateur Astronomy for Almost 100 Years



1927 Convention



Ingalls and Porter 1937 Convention



The 1954 Convention



16-inch Newtonian telescope at the 1967 Convention



Roger Tuthill 12-inch 1973

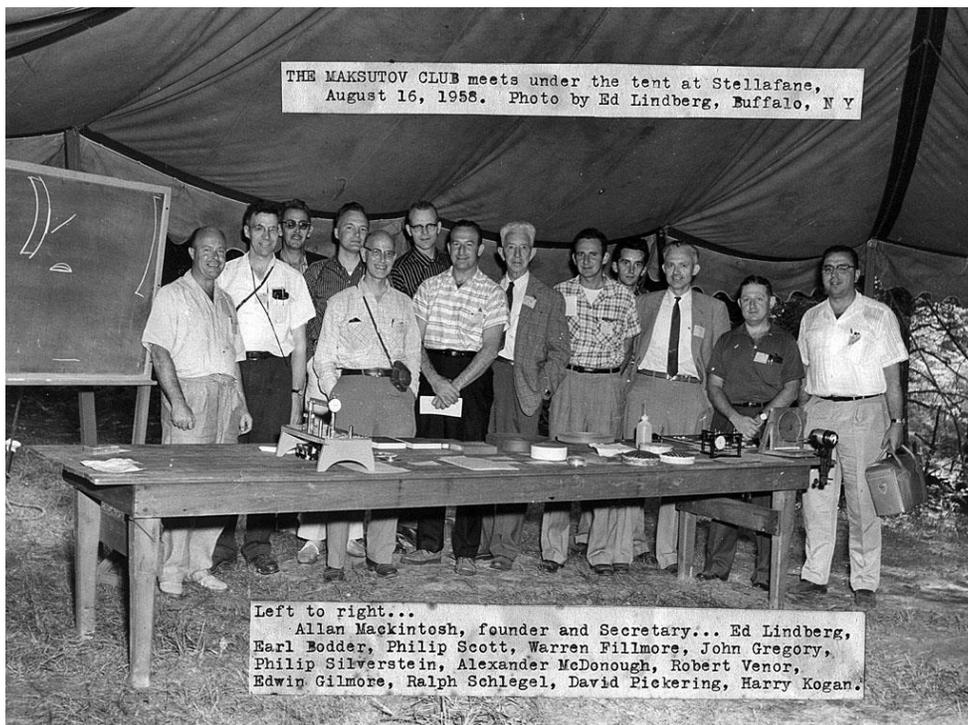


Catadioptric Telescope, Don Dilworth, 1974



Norm James, right, and his floating ball telescope 1976 Convention

Enjoy the Stellafane Convention



THE MAKSUTOV CLUB meets under the tent at Stellafane, August 16, 1958. Photo by Ed Lindberg, Buffalo, N Y

Left to right...
Allan Mackintosh, founder and Secretary... Ed Lindberg,
Earl Bodder, Philip Scott, Warren Fillmore, John Gregory,
Philip Silverstein, Alexander McDonough, Robert Venor,
Edwin Gilmore, Ralph Schlegel, David Eickering, Harry Kogan.



Photo Jim Hendrickson

**“The heavens declare the
glory of God”**