

Value of Vintage Observatories and Historic Telescopes in Communicating Astronomy with the Public

Trudy E. Bell

Antique Telescope Society

E-mail: t.e.bell@ieee.org

Key Words

Antique Telescope
Vintage Observatory
Public Outreach
History of Astronomy

Summary

The Antique Telescope Society convened a thematic workshop, The Vintage Observatory: Thriving in the 21st Century, on 2–4 May 2008. The workshop's purpose was to bring together those charged with the care of observatories and telescopes built before World War II, to examine common issues and share practical solutions, specifically in preparation for the International Year of Astronomy in 2009. Although much of the workshop concerned issues of preservation and restoration, several sessions focused on the uses of historical artefacts as a means for public education and outreach on astronomy and the history of astronomy, including discussion of the unique opportunities *vintage* observatories and telescopes offer in intriguing the public about astronomy.

Introduction

Today worldwide, historically significant telescopes and observatories are an endangered species. Every year, more observatories, large and small, fall victim to college and university boardroom logic that "old = outmoded junk" and "new = best"; thus, vintage telescopes and facilities are being discarded and replaced with modern computer-controlled "go-to" telescopes, or the observatory land is even being turned over to a different use. Disappearing with the artefacts are not only exquisite optics, but also unique and valuable opportunities for communicating to the public both the history of astronomy and the fundamentals of astronomy itself.

History and context

Between about 1800 and 1940, more than 250 private and institutional observatories housing telescopes and other astro-

nomical instruments of various sizes were founded across the United States, plus a similar number in other nations combined. Many were still functioning well into the 1960s and 1970s. In the latter third of the 20th century, however, a great number — including some prominent institutions with large, exquisite instruments — fell into disuse and were decommissioned or wholly demolished. Today, scores lie in disrepair and are in danger of being razed¹.

Historians have become so alarmed about the increasing pace of destruction of historically significant astronomical sites and artefacts that several high level initiatives have been launched worldwide to preserve and protect them.

In 2004, the United Nations' Educational, Scientific, and Cultural Organization (UNESCO) approved a "thematic initiative" on astronomy and world heritage, seeking nominations of astronomical sites for recognition. This initiative inspired the

Historical Astronomy Division (HAD) of the American Astronomical Society (AAS) to consider how the AAS should respond. As input to the deliberations, special sessions on preserving astronomical assets were held at the Biennial Workshop on the History of Astronomy VII in July 2005 at Notre Dame University, the October 2005 annual convention of the Antique Telescope Society at the Cincinnati Observatory, and at the January 2006 session of HAD at the annual AAS meeting in Seattle, Washington. In September 2006, historians David H. DeVorkin of the Smithsonian Institution and Stephen C. McCluskey of West Virginia University — serving as an *ad hoc* committee on preservation — drafted a five-page white-paper memorandum on how the American Astronomical Society might support UNESCO's initiative. In January 2007, the American Astronomical Society established a Working Group on the Preservation of Astronomical Heritage (WGP AH), charged with "*developing and disseminating procedures, criteria*

and priorities for identifying, designating, and preserving astronomical structures, instruments and records so that they will continue to be available for astronomical and historical research, for the teaching of astronomy, and for outreach to the general public”².

Motivated by all these initiatives, in April 2007, a team of five individuals led by the former managing editor of the *Journal of the Antique Telescope Society*, Trudy E. Bell, and the executive director of the Cincinnati Observatory Center, Craig Niemi, sought and received approval from the board of directors of the Antique Telescope Society (ATS) to convene a first-ever thematic workshop devoted to discussing imaginative and non-traditional opportunities and means for historically significant astronomical observatories to thrive in the 21st century.

Within the ATS, it was long known from dozens of successful examples that *historical* equipment has a unique power to convey the wonders and science of *modern* astronomy to the public. Sharing what has worked with others at institutions wondering whether to restore or discard a vintage observatory seemed particularly timely, because of upcoming celebrations in 2008 and 2009 of the 400th anniversary of the invention of the telescope and Galileo’s turning it toward the heavens, as well as of the International Year of Astronomy in 2009³.

The workshop was intended to encourage discussion about a wide range of operational issues, including novel approaches to publicity, fundraising, preservation, restoration, research (both historical and astronomical), and both formal and informal astronomy education. Because one goal also was to introduce people to the human resources within the ATS, the workshop was publicised well beyond the society’s membership to attract a wide variety of individuals with similar interests, including:

- astronomy teachers, professors and informal educators;
- directors/overseers of pre-WWII astronomical observatories;
- museum curators or other custodians of astronomical instruments and books;
- members of amateur astronomy societies or local historical associations;
- preservationists concerned with maintaining local cultural heritage;



Figure 1. Attendees of the Antique Telescope Society’s May 2008 thematic workshop, *The Vintage Observatory: Thriving in the 21st Century*, were photographed on the steps of the main building of the Cincinnati Observatory Center. The photograph was taken by Perry W. Remaklus (front row, all in white). The five co-organisers of the thematic workshop, standing front row centre just to the right of Remaklus, are, in order: Trudy E. Bell (black vest), John E. Ventre (red shirt), Craig B. Waff (plaid shirt), Valerie Niemi (gray jacket) and Craig Niemi (blue shirt).

- board members, trustees, public outreach officers, fundraisers, and donors for the restoration and continued operation of older telescopes or observatories;
- professional restorers of historic astronomical instruments and buildings;
- astronomers;
- historians;
- planetarium directors; and
- historical re-enactors and professional story-tellers.

The workshop itself

After 13 months of intense planning, the thematic workshop, *The Vintage Observatory: Thriving in the 21st Century*, was hosted by the Cincinnati Observatory Center in Cincinnati, Ohio, USA, on 2–4 May 2008⁴.

The beautifully restored Cincinnati Observatory Center affords a gold-standard example of how a historically significant 19th century observatory can thrive in the 21st century, through creative programmes in informal education and public outreach, as well as innovative financial support (including renting the facilities and grounds for corporate retreats, on-location filming, weddings and other special events). Thus, the workshop included a behind-the-scenes tour of the buildings



Figure 2. The historical setting of a vintage observatory allows opportunities for non-traditional informal education about astronomy through techniques more commonly used at Civil War sites and other historical venues, such as historical re-enactors in period dress. At the Friday night ice-cream social at the ATS thematic workshop, Sir Isaac Newton made an unexpected appearance to discuss optics and telescopes. Credit: Pery W. Remaklus.

and instruments, plus observing through the 11¼-inch Merz & Mahler refractor (the largest in the United States when completed in 1845) and the 16-inch Alvan Clark & Sons refractor (still the largest refractor in Ohio since its completion in 1904).

Recognising that small to medium-sized institutions, plus observatories in distress, were likely to have lean budgets, every effort was made to minimise the costs of the workshop to participants. The \$99 registration fee included an ice-cream social on Friday evening plus four full meals (Saturday breakfast, lunch, and dinner, plus Sunday breakfast) and a 2-inch binder and CD of useful references. The registration fee was kept so low because costs were

partially offset by a modest grant from the Cincinnati Observatory Center itself, *pro bono* use of the facilities for three days, and energetic volunteer effort by the Friends of The Observatory. One of the co-organisers (Valerie Niemi) was a travel agent, who also researched modestly priced accommodation and offered to set up economical room-sharing arrangements for attendees.

The programme was absolutely packed (the image of drinking from a fire hose occurred to several attendees). To encourage idea-sharing among registrants, ample time was allotted for discussion both after each individual talk and at the end of each session. One unique event was a hands-on

Saturday evening brainstorming session called Observatory Makeover. For it, those affiliated with instruments or observatories in distress were encouraged to lay all challenges, concerns and obstacles before the compassionate assembled wisdom so that many heads and hearts could offer concrete assessment, recommendations and relevant contacts to extend help for specific situations.

Highlights of public outreach findings

Throughout the workshop, a recurring message was that the highest form of physical preservation of historic artefacts is regular use. Taken as a whole, the presentations and discussions touched on various advantages *uniquely offered by historical observatories* — some with telescopes fairly small by the standards of astronomy today — in communicating astronomy to the public in today's high-tech age. Several highlights distilled from the discussions include:

- The physical beauty of manual vintage instruments has the effect of humanising astronomy and astronomers. Several participants spoke of hearing “Wow!” echoing through the dome when visitors enter and unexpectedly find themselves beholding polished mahogany and gleaming brass rather than antiseptic white lab equipment with computer screens. Many members of the general public already cherish antiques both for their physical beauty and their connection to human history. On an antique telescope, the various knobs and handles of the manual movements silently attest “*touch me — I am also designed for human hands*”. There is tactile pleasure in their use: century-old brass and glass offer a magnificent experience in cultural appreciation. “*History allows us to appeal to people not usually interested in science, by giving them a higher comfort level,*” observed the director of the Dudley Observatory in Schenectady, New York. Describing the work done and discoveries made with the telescope and the personalities of the astronomers who used it also humanises scientists, helping the public to understand their driving curiosity. In essence, she noted, “*We use history to ‘trick’ people into enjoying astronomy — and, by extension, science.*”
- Vintage telescopes offer the public a first-hand *personal* connection to the Universe because the optics of most telescopes fashioned before

World War II were optimised for visual observing with the human eye. Moreover, vintage telescopes by the masters are optically superb. For optical excellence, Alvan Clark and John Brashear are to telescopes what Stradivarius and Guarnerius are to violins: in side-by-side optical tests for colour, resolution and clarity, many modern commercial telescopes of the same aperture pale by comparison. Repeatedly, participants recounted how at star parties or public observing nights that feature both modern and vintage telescopes, without fail people would walk right by the modern equipment — even if it was fitted with a CCD-imaging system and a video screen showing an eye-catching image of a planet or galaxy — and head straight for the antique instrument, saying, “I want to look through a telescope.” Even if the image shown on the computer screen showed more colour or detail than a human eye

could perceive through an eyepiece, members of the general public still wanted to see a celestial object *with their own eyes*. Workshop participants remarked how they often heard gasps when visitors took their first-ever look through a telescope — and that years later, some members of the public still recollect how inspired and awe-struck they felt at *personally* viewing the rings of Saturn or the moons of Jupiter or the pale Ring Nebula in Lyra.

- The clearly visible gears and setting circles of vintage telescopes can concretely demonstrate the fundamentals of the celestial sphere. Because older instruments are wholly manual, the motions of the telescope mount can be used to illustrate concepts such as celestial latitude and longitude, compensation for the rotation of the Earth, the position of the observer’s meridian, etc. One presenter recounted: “As

I was talking about slewing west [to find an object], the father of a student exclaimed, ‘I don’t get all this east–west stuff — what is it?’ So I stopped and explained it to him, using this giant equatorial mount as an example. I argue that such teachable moments happen only because I was not standing at a point-and-click console pressing a button that said ‘GO TO [object]’, but instead was reading the circles and searching for the target manually with an antique instrument.” With a manual telescope, abstract concepts are made physically concrete.

- The size of a vintage telescope, whether large or small, is an asset in communicating astronomy to the public. The director of the Charles E. Daniel Observatory at the Roper Mountain Science Center in Greenville, South Carolina, at which is mounted the 23-inch Alvan Clark refractor originally installed in 1882 at the Halsted Observatory at Princeton University, recounted how he often hears impressed members of the public exclaim, “That is the biggest telescope I’ve ever seen!” The telescope tube is well over 30 feet long, three times longer than modern compact Schmidt–Cassegrain reflectors of equivalent aperture and thus three times as impressive. On the other hand, a small antique refractor with a lens just a few inches across conveys the silent message “you, too, can appreciate the stars from home with a modest instrument — you don’t need to be a professional”.

- Vintage telescopes can awaken the public’s historical awareness of how astronomical observatories are part of our *cultural* heritage. In the late 19th century, the race to build the world’s largest telescope was the Victorian space programme. Most non-historians readily accept the value of preserving our cultural heritage in rare and precious documents (such as the Declaration of Independence), artefacts (such as the *Mona Lisa*), structures (such as the Golden Gate Bridge or the Brooklyn Bridge) and institutions (such as the birthplaces of US Presidents) in addition to books and photographs. The public even readily accepts the value of preserving the first telescopes of Galileo and Newton. It is but a short step to explain that in the nineteenth century, telescopes were romantic icons, revered as crowning achievements of the industrial revolution, to the point that every small town that built an observatory basked in an exalted status. Such history can then lead to descriptions of some of the 19th century’s prin-



Figure 3. A group of middle school students are shown the 23-inch Alvan Clark refractor at the Charles E. Daniel Observatory at the Roper Mountain Science Center in Greenville, North Carolina by staff astronomer Doug Gegen. Originally built for Princeton University in 1882, this telescope is now one of the largest vintage refractors in the nation regularly devoted to education and public outreach. Credit: Roper Mountain Science Center.

cial discoveries, and thus directly to the development of astronomical concepts.

- A superbly working vintage telescope clearly demonstrates that a telescope's mechanical usefulness is a function of care and maintenance, not of age — and that the optics are ageless. A century ago, telescopes were consciously designed and crafted for all time; they also were built to be accessible for routine cleaning and lubrication. Instruments decay not when a telescope or observatory attains a certain age, but when they lie neglected for surprisingly few years. Even a modern computerised “go-to” telescope installed as recently as 2000 may be effectively junk today if its dome has been left open to rain, birds and vandals; moreover, even if it has been physically maintained, it may still be effectively useless if its software has not been kept up to date — a worthwhile caution for today's consumerist disposable culture.
- A vintage telescope that participates in an ongoing programme of regular observations communicates the fact that century-old instruments are highly useful even for 21st century astronomical *research*. For members of the public interested not only in stargazing, but also pursuing a personal astronomical research project of genuine scientific value, much has been written about research opportunities well within the reach of telescopes of small aperture (as small as three inches!), including vintage instruments⁵. Like Audubon bird counts or migrating salamander counts, which need manpower more than specialised instruments, certain types of astronomical research (for example, on comets, variable stars, double stars, and lunar and asteroid occultations) require careful systematic observations by many geographically dispersed sets of eyes, not large apertures or modern equipment.

Conclusions

Success stories abound about the unique advantages of vintage telescopes and observatories for communicating astronomy to the public. But altogether too many historic observatories, large and small, are now teetering on the brink, some of them with sizeable and historically important instruments. Once telescopes and observatories are demolished, often in secret and too fast for public comment, our astronomical and cultural heritage — plus its value for communicating astronomy to a 21st century public — is gone *forever*.

The Antique Telescope Society

The Antique Telescope Society, founded in 1991, is an international organisation. Recognised as a tax-exempt organisation under Section 501(c)(3) of the Internal Revenue Code, its purpose is to unite colleagues interested in antique astronomical telescopes, binoculars, books and related items; and to promote the memberships' interests in astronomical history and discovery, the history of optics, and the preservation and use of astronomical instruments through stewardship and education. The principal activities of the Antique Telescope Society are publishing a journal, organising meetings, providing assistance with the restoration of instruments, hosting shows and displays, preserving historical data and guiding collectors. More information can be found at <http://oldscope.org/>.

The Cincinnati Observatory Center (COC), also a 501(c)(3) organisation, promotes the study, practice and enjoyment of astronomy among a broad audience. It also assists professional and amateur astronomers, schools and universities in furthering their educational efforts on behalf of astronomy and related STEM (science, technology, engineering and mathematics) disciplines. While fulfilling this mission, the COC maintains the integrity and heritage of an historic 19th century observatory, including relevant artefacts illustrating the history of astronomy and its relationship to broader fields of science throughout the years. The fully functional 1845 Merz & Mahler and 1904 Alvan Clark & Sons telescopes are the backbone of this unique educational centre and are used by students of all ages almost every clear night. More information can be found at www.cincinnatiobservatory.org.

Notes

¹ Just since 2000, casualties have included the Flower and Cook Observatory in Philadelphia, Pennsylvania, and transit circle telescope buildings at the US Naval Observatory, the latter against advice from both their own architectural historian and the US Commission of Fine Arts. Observatories now boarded up with dim futures include the Ricard Observatory of Santa Clara University (16-inch Clark refractor). Also facing an uncertain future is the 40-inch of Yerkes Observatory in Williams Bay, Wisconsin (still the world's largest refractor) and the 61-inch Fecker reflector of Oak Ridge Observatory in Harvard, Massachusetts (largest telescope east of the Mississippi). Observatories that have been successfully restored for public outreach and education include the Cincinnati Observatory (now called the Cincinnati Observatory Center, with its 11½-inch Merz and 16-inch Clark), the Chamberlin Observatory in Denver (20-inch Clark), and the Mount Wilson Observatory (with the 100-inch Hooker reflector, once the largest telescope in the world) in California.

² The focus of the AAS's Working Group on the Preservation of Astronomical Heritage is more on 19th and 20th century instruments, observatories and papers; information about it (including this quoted text) appears at <http://members.aas.org/comms/wgpah.cfm>. Background about the UNESCO initiative on astronomy and world heritage appears at <http://whc.unesco.org/en/astronomy>. and here <http://www.astronomicalheritage.org/>.

³ For more about IYA2009 and beyond, see <http://www.astronomy2009.org/>. For one site about a public television special on the 400th anniversary of Galileo's turning the telescope onto the heavens, see <http://www.400years.org/>.

⁴ Details about the thematic workshop, The Vintage Observatory: Thriving in the 21st Century, still appear on the Antique Telescope Society website at <http://www.oldscope.org/in2008ws.htm>. The eight-page final programme is available

at <http://www.webari.com/oldscope/document/tws080502-final-program.pdf> and abstracts of all the talks (17 pages) at <http://www.webari.com/oldscope/document/tws080502-abstracts.pdf>.

⁵ Many resources about astronomical research by small telescopes are relevant for instruments of all vintages, and are focused on research that can be done to supplement school curricula rather than for public outreach. Nonetheless, some of the information is relevant to pre-war instruments for communicating astronomy to the public. One key reference book is Russell M. Genet, Jolyon M. Johnson and Vera Wallen, editors, *Small Telescopes and Astronomical Research*, Collins Foundation Press, 2010 and the National Academies of Science 2010 position paper, *The Small Research Telescope Challenge*, at <http://www.eclipse-t.com/nas%20paper.pdf>. See also Terry D. Oswalt, *Preserving Access to Small Observatories Throughout the World: The Role of University Consortia and Collaboration*, International Amateur–Professional Photoelectric Photometry Communications, 69 (Fall 1997), p 1–5, <http://adsabs.harvard.edu/full/1997IAPPP.69....10>.

Biography

Trudy E. Bell (M.A. 1978, New York University) is a former editor for *Scientific American* and *IEEE Spectrum* magazines and the author, co-author, or editor of a dozen books. Nineteen of her 450+ articles have won top journalism prizes, including the 2006 David N. Schramm Award of the American Astronomical Society. For the Spring 2010 semester, she was a Presidential Fellow in the SAGES Program at Case Western Reserve University.



From sunspots to black holes, planets around other stars, supernovae and dark matter, *Postcards from the Edge of the Universe* is a book that unveils the mysteries of today's research, looking at cutting-edge astronomy from around the world. Twenty-four frontline astronomers from all corners of the globe explain their science in accessible language.

Buy the book on-line: www.eso.org/shop

www.postcardsfromuniverse.org

TRONC: This spectacular panoramic view shows the Carina Nebula and was taken with the Wide Field of View Imager on the MPG/ESO 2.2-metre telescope at ESO's La Silla Observatory in Chile.

From sunspots to black holes, planets around other stars, supernovae and dark matter, *Postcards from the Edge of the Universe* is a book that unveils the mysteries of today's research, looking at cutting-edge astronomy from around the world. Twenty-four frontline astronomers from all corners of the globe explain their science in accessible language.

Download a free PDF or buy the hard copy for only 9.90 € at:

www.postcardsfromuniverse.org

and send an electronic postcard from the edge of the Universe to all your friends

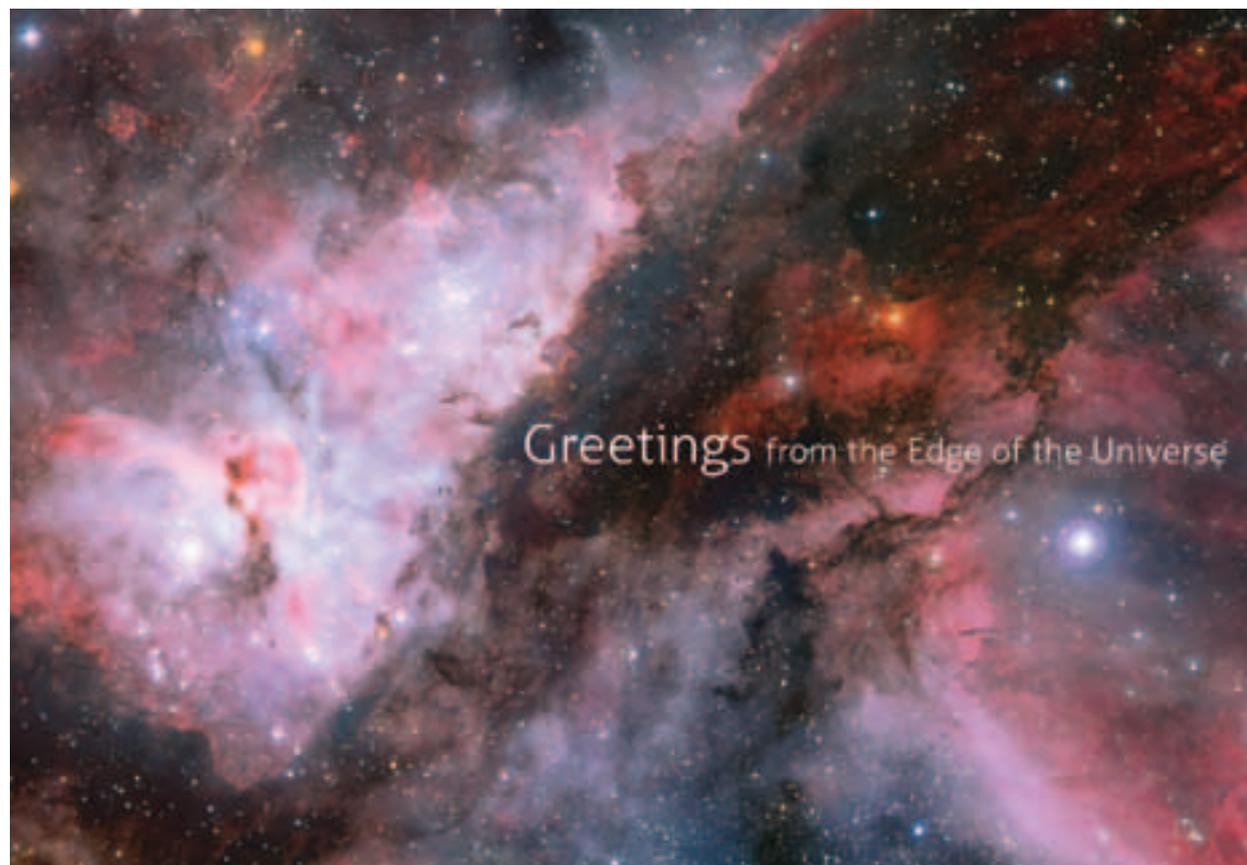
EXPLORE THE ONLINE PORTAL TODAY!
www.portaltotheuniverse.org

PORTAL TO THE UNIVERSE

an initiative by

supported by

A universe of discovery at your fingertips!
 Updated around the clock and featuring the latest press releases and podcasts plus hundreds of blogs and new astronomical images from all over the world.



CAPjournal submission guidelines

We are keen to encourage readers to submit their own articles, reviews, etc. Some key points are addressed below.

Technical and esoteric language should be either avoided or used with a footnoted explanation if absolutely required. All contributions will be made to conform to British spelling and punctuation practice. Figures and tables should be referred to 'Figure n' and 'Table n' respectively. Acronyms should be spelt in full once and then parenthesised; henceforth they can then be used as lettered acronyms. Numerals should be used for numbers greater than two words and always for numbers greater than ten.

Manuscripts should be delivered in MS Word or text (.txt) format, with no formatting apart

from bold, italics, super- and subscripts. Hard carriage returns after each line should be avoided, as should double spacing between sentences. If the contribution contains figures, these may — just for the sake of overview — be pasted inline in the Word manuscript along with the caption (Word files below 4 MB are encouraged). However, images must also be delivered individually as Tiff, PDFs, vector-files (e.g. .ai, .eps) in as high a resolution as possible (minimum 1000 pixels along the longest edge).

Copyright

Authors are solely responsible for ensuring copyright clearance to reproduce illustrations, text, etc., for which they themselves do not own the copyright. CAPjournal accepts only original submissions and will only reproduce previously published work by special arrangement.

Contact

Submissions should be sent to the Editor: editor@capjournal.com

Submit articles for one of the following journal sections:

Announcements
Reviews
News
Resources
Innovations
Research & Applications
Letters to the Editor
Opinion
Best Practices
Interviews

www.capjournal.org

Online issues
Free subscriptions
Article submission

Sponsors

