

An aerial photograph of agricultural fields. The fields are divided into sections by a narrow strip of trees and a road. The fields are lush green, and the road is a light gray color. The overall scene is a typical rural landscape.

HPS&ST

NEWSLETTER

HPS&ST NEWSLETTER

JUNE 2021

The HPS&ST NEWSLETTER is emailed monthly to about 9,500 individuals who directly or indirectly have an interest in the contribution of history and philosophy of science to theoretical, curricular and pedagogical issues in science teaching, and/or interests in the promotion of innovative, engaging and effective teaching of the history and philosophy of science. The NEWSLETTER is sent on to different international and national HPS lists and international and national science teaching lists. In print or electronic form, it has been published for 40+ years.

The NEWSLETTER seeks to serve the diverse international community of HPS&ST scholars and teachers by disseminating information about events and publications that connect to concerns of the HPS&ST community.

Contributions to the NEWSLETTER (publications, conferences, opinion pieces, etc.) are welcome and

should be sent direct to the editor: Michael R. Matthews, UNSW (m.matthews@unsw.edu.au).

The NEWSLETTER, along with RESOURCES, OBITUARIES, OPINION PIECES and more, are available at the website: <http://www.hpsst.com/>

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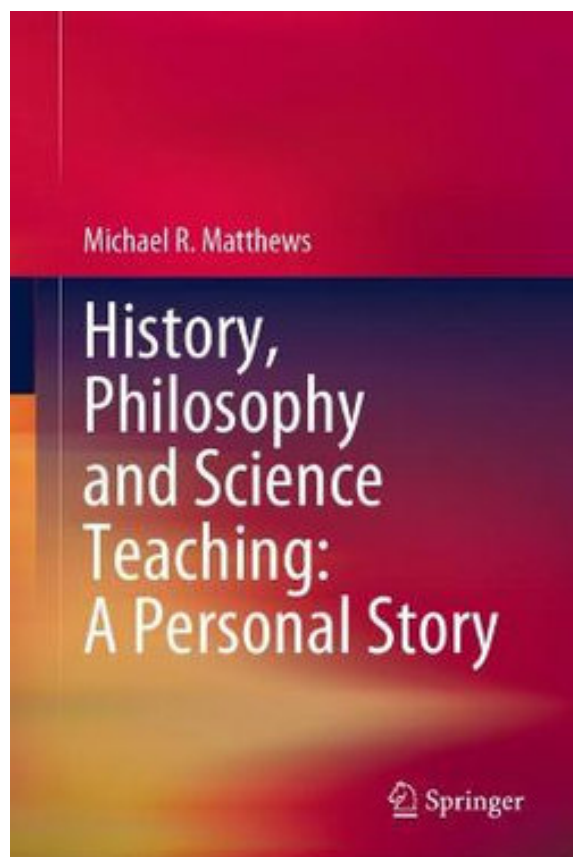
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Michael R. Matthews: History, Philosophy and Science Teaching: A Personal Story, Springer, 2021

This book of ten chapters, 298 + xxv pages and 800 references is an historical narrative of [the author's](#) academic appointments, his significant research and publication endeavours, important editorial and institutional engagements, and appraisals of many important debates and contributors in science education.

The author is Honorary Associate Professor in the School of Education at the University of New South Wales. He has degrees in Geology, Psychology, Philosophy, History and Philosophy of Science, and Philosophy of Education.



He has taught in high school, teachers' college and university; was Foundation Professor of Sci-

ence Education at the University of Auckland; was Foundation President of the International History, Philosophy and Science Teaching Group; was Foundation President of the Inter-Divisional Teaching Commission of the DHST and DLMPs; and is a Fellow of the Royal Society (New South Wales).

[The ten chapters](#) begin with his Australian-Irish family life, his Catholic school education, his rich undergraduate education, then further degrees at Sydney University whilst school teaching, then range over a number of the central theoretical, curricular and pedagogical issues in science education to which he has contributed. The final chapter is a proposal for HPS-informed science teacher education.

The book gives accounts of philosophers who greatly influenced his own thinking and who also were personal friends – Wallis Suchting, Abner Shimony, Robert Cohen, Marx Wartofsky, Israel Scheffler, Michael Martin and Mario Bunge.

The book, throughout, advocates the importance of clear writing and avoidance of faddism in both philosophy and in education. It documents, disturbingly, many examples of the latter.

Positive reviews by Michael Reiss (Science Education, University College London), Eric Scerri (Chemistry Department, University of California Los Angeles) and Roland Schulz (Education, Simon Fraser University) are available [here](#).

Book details, chapter titles and previews, and purchasing information can be seen [here](#).

The book is available in print copy and eBook. From June 20 to July 18 there is a 20% discount available by using the following Springer token when purchasing from the Springer site:

xRMtG7SJe4B2Ddd. This token is part of the above web address.

The book is available to individuals as a MyCopy for EUR/USD25. This is simply a paperback version of the print hardcover book. Obtaining a MyCopy requires first that an individual's institution has purchased the eBook. It does not apply when the hardcover alone has been purchased, though the eBook alone suffices to make the MyCopy available. This often happens automatically as the eBook will be part of a Springer package bought by institutions. If not, the institution needs to independently purchase the eBook. Librarians can advise through which channels the MyCopy is then purchased. This is a most suitable arrangement for instructors wishing to use the book as a course text.

Springer are facilitating reviews of the book in relevant HPS, Philosophy, Education and Science Education journals and newsletters. Review editors should send reviewer's name and email, along with journal/newsletter name and website to:

Nick Melchior Nick.Melchior@springer.com

Reviewers are initially provided with the eBook, and upon publication of the review, are mailed the print version.

Paul Bunge Prize 2022

The German Chemical Society (Gesellschaft Deutscher Chemiker - GDCh) and the German Bunsen Society for Physical Chemistry (Deutsche Bunsen-Gesellschaft für Physikalische Chemie) invite proposals for the Paul Bunge Prize 2022.

The prize is awarded annually by the Hans R. Jenemann-Foundation and is named after Paul

Bunge (1839–1888), the most important maker of precision balances in the second half of the nineteenth century.

The Paul Bunge Prize honours outstanding research publications on all aspects of the history of scientific instruments. The prize is endowed with 7.500 Euro. It is awarded for either individual books or papers published within the last five years or for lifetime achievements. Submitted works may be published in English, German or French.

Both self-applications and nominations are accepted. Both should include the publications to be considered, a curriculum vitae and a complete list of publications. The Advisory Board of the Hans R. Jenemann Foundation will decide on the prize winner.

Submit your application or nomination, including a cover letter, by **30 September 2021** via the online form at www.gdch.de/paulbungepreis or to j.herr@gdch.de. Though digital versions are explicitly preferred, printed copies can be sent to the GDCh office attn: Dr. Jasmin Herr.

Further Information:

Gesellschaft Deutscher Chemiker,
Dr. Jasmin Herr - j.herr@gdch.de

German Society for Philosophy of Science, Fourth International Conference, Berlin March 2022

The German Society for Philosophy of Science (Gesellschaft für Wissenschaftsphilosophie – GWP) was founded in September 2011 with the aim to better integrate the community of philo-

sophers of science and scientists interested in philosophy of science in Germany and thereby to promote the field at a local and international level. The GWP organises an international conference every three years. Our fourth conference will be hosted by the TU Berlin in March 2022.

We invite contributed papers across all fields of philosophy of science. Contributed papers will be clustered into parallel sessions focusing on particular themes or special sciences.

The recommended conference language is English, but contributions in German will also be considered.

Local organisers: Axel Gelfert (chair), Birgit Beck, Beate Krickel

GWP organisers: Gerhard Schurz (president), Uljana Feest, Christian J. Feldbacher-Escamilla, Alexander Gebharter, Vera Hoffmann-Kolss, Thomas Reydon

For submission via EasyChair see: <http://gwp2022.wissphil.de>

The deadline for all submissions is: **June 30, 2021.**

Philosophy of Science Association (PSA) Covid Teaching Resources

Teaching Philosophy in the Time of COVID is a new resource page on the PSA website. It features syllabi, articles, videos, podcasts, and other resources related to philosophy and the coronavirus. If you've found an interesting source on philosophy and the coronavirus, we invite you to submit it. The page will be updated weekly with new materials that are useful for professors teaching philosophy and COVID in the classroom or for whomever is trying to think philosophically about

the pandemic.

Details available [here](#).

Assistant Editor Required, HPS&ST Newsletter

The History, Philosophy and Science Teaching Newsletter has been produced, in one form or another, for 40+ years. It is now published on the web. The Contents announcement goes directly to about 9,500 emails and to different HPS lists and science education lists.

The newsletter has been edited by Michael Matthews at the University of New South Wales (m.matthews@unsw.edu.au). There are two Assistant Editors, Paulo Maurício, Lisbon (paulo.asterix@gmail.com) and Nathan Oseroff-Spicer, London, (nathanoserooff@gmail.com).

A third assistant editor is now being sought in order to contribute to the Contents and Promotion of the newsletter, and particularly with seeking out and inviting Opinion Page essays from science educators and historians and philosophers of science. This is an opportunity to join an established team and contribute to the growth of the international HPS&ST community.

All enquiries to the editor or assistant editors.

Opinion Page: Where Science and Miracles Meet, Alan Lightman, MIT

Alan Paige Lightman is an American physicist, writer, and social entrepreneur. He has served on the faculties of Harvard University and Massachusetts Institute of Techno-

logy (MIT) and is currently a Professor of the Practice of the Humanities at the Massachusetts Institute of Technology (MIT). He was one of the first people at MIT to have a joint faculty position in both the sciences and the humanities. In his thinking and writing, Lightman is known for exploring the intersection of the sciences and the humanities, especially the dialogue between science, philosophy, religion, and spirituality.

He is the author of the international best-seller *Einstein's Dreams* which has been translated into more than 30 languages and adapted into dozens of independent theatrical and musical productions worldwide, most recently (2019) at the off Broadway Prospect Theatre in New York. It is one of the most widely used "common books" on college campuses. Lightman's novel *The Diagnosis* was a finalist for the National Book Award. He is also the founder of [Harpswell](#), a non-profit organisation whose mission is to advance a new generation of women leaders in Southeast Asia.



On the morning of October 13, 1917, a year from the end of World War I, a crowd of tens of thousands gathered in the town of Fátima, Portugal. They came to witness a miracle. Three

shepherd children had prophesied that the Virgin Mary would miraculously appear on that day and give the world a sign. In the previous several months, the three children—Lúcia Abobora, and Francisco and Jacinto Marto—had claimed to have seen apparitions, visions much discussed by the Portuguese press. On this day, the gathered pilgrims apparently got what they came for, a spectacle since referred to as “the Miracle of the Sun.” One journalist at the scene, Avelino de Almeida, an editor at *O Século*, reported in his paper:

One can see the immense crowd turn toward the sun ...and we hear the nearest spectators crying, “Miracle, miracle! Marvel, marvel!” Before the astonished eyes of the people ...the sun has trembled, and the sun has made some brusque movements, unprecedented and outside of all cosmic laws—the sun has “danced” ...The greatest number avow that they have seen the trembling and dancing of the sun. Others, however, declare that they have seen the smiling face of the Virgin herself; swear that the sun turned around on itself like a wheel of fireworks, that it fell almost to the point of burning the earth with its rays.

I’ve had miracles on my mind for a number of reasons. To start with, a few friends recently told me about personal experiences that they thought were miracles. I also came upon some survey data. According to the [Pew Research Center](#), as many as 79 percent of Americans believe in miracles – events that lie outside natural law and any explanation by science. Not just the parting of the Red Sea or the resurrection of Jesus or the splitting of the moon by Muhammad, but “supernatural” phenomena in the world of today: such things as ghosts, voices from the dead, instructions from God, accurate prophecies, sudden recoveries from grave illnesses, telekinesis, reincarnation. Hundreds of people write to the evangelical Mario

Murillo Ministries website with reports of miracles.

A woman recently described there how her brother's stroke and paralysis in March 2019 had been cured overnight by prayer. "I have NO doubt it was a miracle," she said. The violinist and musician Bonnie Rideout wrote to me about her first miraculous experience:

An unexplainable light appeared before me in the alfalfa field. It was a ball of light about six feet off the ground, motionless and accompanied by a warm gentle breeze. I had a feeling of warmth and peace. Even at the age of six and never having been told of guardian angels, I knew it was something of such ilk. It was the first experience I had that made me conscious of a mystical entity that has intentions and is aware of me always.

These are just two accounts from the roughly 200 million miracle believers in the United States today. Many miracles are associated with God, but not all are. [According to Pew](#), 65 percent of Americans believe in miracles not necessarily connected to God.

In contrast to this widespread belief in miracles, the great majority of scientists firmly and unequivocally reject anything "supernatural." Given some ostensibly miraculous event, almost all scientists will insist on a logical, rational, "natural" explanation. (Scientists dismiss the Fatima Miracle of the Sun as the result of local atmospheric effects, spurious images on the retina brought about by staring at the sun, and self-delusion.) If no logical or rational explanation immediately presents itself, most scientists will conclude that a scientific explanation will eventually be forthcoming, rather than abandon their commitment to a totally lawful universe.

This prevailing view was articulated to me recently by the Nobel Prize-winning biologist David Baltimore:

If I could not find any way out of believing that a miracle had occurred, would I then believe it to be a miracle? I think the answer is that I would still not believe it to be a miracle, only some outcome that I can't understand.

When believers and nonbelievers discuss or witness a seemingly miraculous event, they find little common ground, as if one is speaking French and the other Swahili. Such radically different attitudes represent radically different views of the world, which are largely impervious to argument or appearance and have some resonance with our deeply polarised society today. And yet, surprisingly, some recent proposals in physics reveal that believers and nonbelievers may have more in common than they think.

The miraculous has meaning and definition only by comparison with the non-miraculous. That is, for an event to be declared "supernatural," we must first have some concept of the "natural," the ordinary course of events. Early human beings had no such concept – except perhaps for individual deaths and the repeated rising and setting of the sun. Phenomena simply happened. Nature was strange, sometimes beautiful, largely unpredictable, and often frightening. Some concept of the "supernatural" must have been understood in the powers attributed to the gods and spirits of early civilisations. These mythic beings could perform feats beyond those possible for mortal flesh and blood. According to ancient Chinese belief, the god of archery, Yi, had such prowess with the bow and arrow that he shot down nine of the 10 suns that crossed the sky. And there was clearly an established concept of the miraculous in the feats of

Jesus.

The development of the so-called laws of nature in science, which began with the ancient Greeks, gave a sharper definition of the natural versus the supernatural. Around 250 B.C., Archimedes proposed his “law of floating bodies,” which stated how much liquid would be displaced by a partially submerged object: a weight equal to the weight of the object, regardless of its size or shape. Isaac Newton was a landmark figure in the emerging concept of a lawful and miracle-free universe. His 1687 law of gravity – stating that the gravitational force between two objects is proportional to the product of their masses and inversely proportional to the square of their distance apart – was not only one of the first mathematical expressions of a fundamental force underlying the motions of bodies. It was also the first proposal that a rule for the behaviour of material bodies on Earth should apply in the heavens as well – that is, the first real understanding of the universality of a law of nature.

Then, in the 19th century, physicists proposed and confirmed detailed laws for the behaviour of electricity and magnetism. By 1900, the absolute inviolability of the laws of nature was well established as part of the central doctrine of science. In the thousands of natural phenomena that scientists have observed—from the orbits of planets to the firings of neurones to the radiation of atoms—they have always found rational, logical, and usually testable explanations, cementing their belief in the lawfulness and predictability of nature.

What is the origin of these strong commitments for and against miracles?

Part of the appeal of miracles was stated by the Scottish philosopher David Hume in his 1748 essay “[Of Miracles](#)”: “The passion of *surprise* and *wonder* arising from miracles, being an agreeable

emotion, gives a sensible tendency towards the belief of those events from which it is derived.” In their book *Wonders and the Order of Nature*, the historians of science Lorraine Daston and Katharine Park document humankind’s enchantment with wonders and oddities. Things that don’t fit. Surprises and peculiarities. Miracles. Marco Polo enthuses over finding completely black lions in the Indian Kingdom of Quilon. Other travellers excitedly record gourds with little lamblike animals inside, beasts with the faces of humans and the tails of scorpions, unicorns, and people who vomit worms.

Ross Peterson, a psychiatrist practicing in the Boston area, told me: “We want miracles as a solution to helplessness. We want miracles for meaning at a deeper level. Miracles lift us out of a humdrum life.” Peterson says that all of us fall on a spectrum, with hysterical emotion at one end and emotionless rigidity at the other. I would suggest that those of us who believe in miracles are more able to surrender ourselves fully to our emotional experiences and the nonmaterial world they might represent, without attempting to analyse or reduce such experiences. Those of us who become scientists, through our understanding of scientific achievements and especially the logical construction of the laws of nature, are satisfied by a fully lawful explanation of the world and see no reason to invoke anything supernatural.

That is not to say that scientists are emotionally rigid on Peterson’s spectrum. But they have compartmentalised those emotions. Scientists have such abiding faith in a lawful cosmos that any personal experience or recounted “story” that seems to violate the laws of nature is recast as “to be understood with a lawful explanation” rather than accepted as fundamentally unlawful or miraculous.

I remember when I first came to the “lawful explanation” viewpoint myself. At the age of twelve or thirteen, I built my own laboratory and stocked it with test tubes, petri dishes, Bunsen burners, beautiful curved glassware, resistors, capacitors, and coils of electrical wire. Among other projects, I began making pendulums by tying a fishing weight to the end of a string. I’d read in *Popular Science* or some similar magazine that the time for a pendulum to make a complete swing was proportional to the square root of the length of the string. With the help of a stopwatch and a ruler, I verified this wonderful law. Logic and pattern. Cause and effect. As far as I could tell, everything was subject to analysis and quantitative testing. I saw no reason to believe in supernatural events or in any other unprovable hypotheses.

To Hume’s and Peterson’s arguments, I would add one more suggestion as to why many of us believe in miracles. We desire escape from the limited capacities of our material bodies. We yearn for some kind of permanence, something eternal, something beyond our impending personal death. A world in which miracles occur might contain such a possibility. In this regard, it is not surprising that [a survey by Pew’s](#) 2014 Religious Landscape Study found that 72 percent of Americans believe in heaven, defined as a place where “people who have led good lives are eternally rewarded.”

Recent discoveries in science underscore the extreme commitments of believers and nonbelievers to their respective views of the world. In the 1960s, scientists first noticed what has become known as the “fine-tuning problem”: The numerical value of many of the fundamental constants of nature, such as the speed of light or the strength of the forces in the nuclei of atoms, must lie within a narrow range for life to arise in our universe – not merely life similar to life on Earth, but any kind of life.

For instance, if the strength of the nuclear force had been just a little greater, all of the hydrogen in the early universe would have fused to form helium. With no hydrogen remaining, there would be no water. Biologists believe that water, with its special chemical properties, is needed for life. By contrast, if the nuclear force had been just a little weaker, the bigger atoms needed for life, such as carbon and oxygen, could not hold together.

One of the most striking of these finely tuned constants is the amount of so-called dark energy in the cosmos. Dark energy, first discovered in 1998, fills up all of outer space and acts in the opposite way of normal gravity. It causes the galaxies to move away from one another with increasing speed. The density of dark energy has been measured to be about 100-millionth of an erg per cubic centimetre. (Don’t worry if you aren’t familiar with these arcane units. The important point is that it is a specific number.) If the amount of dark energy in our universe were a little larger than it actually is, gaseous matter could never have pulled together to form stars. A little smaller, and the universe would have re-collapsed and ended before stars had time to form. Physicists have strong evidence that all of the bigger atoms needed for life were created at the centres of stars. Without stars, no big atoms and no life.

So [how to explain](#) this observed fine-tuning? Why should our universe care about life? There are two explanations, one offered by believers and one by nonbelievers. Believers give the argument of Intelligent Design: that the universe was designed by God, who wanted the universe to have life. Alvin Plantinga, a professor emeritus of philosophy at the University of Notre Dame, wrote, “It still seems striking that these constants should have just the values they do have ... It is still much less improbable that they should have those values

if there is a God who wanted a life-friendly universe.”

The majority of scientists are not comfortable with this argument – not because it invokes God, but because it invokes a cause not subject to rational analysis. An explanation that many scientists accept is what is called “the multiverse.” If there are lots of universes with different properties – some with 17 dimensions or some with 12 dimensions, some with values of dark energy much larger or much smaller than in our universe, some with nuclear forces much stronger or weaker, and so on – then some of those universes would, by chance, have the right properties to make stars and life. Most would not. By definition, we live in one of the universes that permits life. According to this explanation, our universe is just an accident, a random throw of the dice.

An analogous line of reasoning is the explanation of why our planet is the right distance away from the sun to have liquid water. If we were a bit closer, all of the water would evaporate in the high heat, and if we were a bit farther away, it would freeze in the cold. The scientific answer to that seemingly extraordinary fact is simply that there are lots of planets besides Earth. Some are the right distance from their central stars to have liquid water, but most are not.

The inconvenient truth about both of these explanations of the fine-tuning problem – intelligent design, on the one hand, and the existence of a multiverse, on the other – is that neither can be proved. Both must be taken as a matter of faith by their respective supporters. Believers cannot prove the existence of God, much less what God’s intentions were in creating the universe. It is likely that scientists will never be able to prove that other universes exist. The different universes in the

hypothesised multiverse can never communicate with one another for the infinite future. And if they were connected in some way in the infinite past, confirming that connection would present the same problems as understanding how our universe came into being before the Big Bang. Even with a theory, testing that theory would be next to impossible. It is a testament to the powerful commitment of scientists to their belief in a totally lawful and miracle-free cosmos that they are willing to invoke a slew of probably unverifiable other universes to uphold their belief.

In 1934, the great philosopher of science Karl Popper introduced the concept of *falsifiability* in determining the boundaries of science. A scientific theory or idea can never be proved true, because we cannot be certain that tomorrow a new phenomenon won’t contradict the theory. However, a scientific theory can certainly be proved wrong, or falsified, by the observation of a single phenomenon at odds with it. Popper argued that if a proposition or belief or theory could not be tested, and thus potentially proved wrong, it did not lie within the realm of what we call science. Philosophy or religion or mythology, perhaps, but not science.

Which brings us back to the proposal of the multiverse. Is it science or not? Are the many physicists who endorse the multiverse idea thinking as scientists? There is indeed a chain of scientific argument supporting the proposal. The Nobel Prize-winning physicist Steven Weinberg used the multiverse idea to predict the approximate value of dark energy before the value was discovered. And the Stanford University physicist Andrei Linde’s theory of “eternal chaotic inflation” actually predicts the creation of multiple universes with different properties. But the multiverse idea remains untested and probably untestable.

A similar predicament at the forefront of physics has occurred with “string theory,” in which it is conjectured that the smallest subatomic entities of matter and energy are not point-like particles but one-dimensional “strings” of energy. Moreover, according to the requirements of the theory, these strings vibrate in a space of 10 or 11 dimensions – all but three (height, width, and length) curled up into ultra-tiny loops that we cannot see. There are strong theoretical ideas and a lot of beautiful mathematics in favour of string theory. But, as with the multiverse idea, testing it may never be possible.

So, we have reached a paradox: The commitment to a totally scientific view of the world has led to theories that may be unscientific, according to Popper’s definition of science. In a sense, the miracle believers and the miracle nonbelievers have found a bit of common ground. This is not to say that the transcendent experience of miraculous phenomena has somehow fused with the 0’s and 1’s of modern science, or that the world-views of believers and nonbelievers have merged. But both believers and nonbelievers have sworn allegiance to concepts that cannot be proved. Those passionate beliefs must originate from somewhere deep inside our minds, a secret room that all of us share, vital and primitive, like the ancient rituals of our ancestors.

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March 22, 2021

Invitation to Submit Opinion Piece

In order to make better educational use of the wide geographical and disciplinary reach of this HPS&ST NEWSLETTER, invitations are extended for readers to contribute opinion or position pieces or

suggestions about any aspect of the past, present or future of HPS&ST studies.

Contributions can be sent direct to [Michael Matthews](#) or [Nathan Oseroff-Spicer](#).

Ideally, they might be pieces that are already on the web, in which case a few paragraphs introduction, with link to web site can be sent, or else the pieces will be put on the web with a link given in the NEWSLETTER.

They will be archived in the OPINION folder at the HPS&ST web site: <http://www.hpsst.com/>.

PhD Theses in HPS&ST Domain

The HPS&ST NEWSLETTER is the ideal medium for publicising and making known submitted and awarded doctoral theses in the HPS&ST domain.

The following details should be submitted to the editor at m.matthews@unsw.edu.au:

- Candidate’s name and email
- Institution
- Supervisor
- Thesis title
- Abstract of 100-300 words
- Web link when theses are required to be submitted for open search on web.

Recent HPS&ST Research Articles

Journal of the History of Biology (Volume 54, issue 1, April 2021)

Special issue: Connecting to the Living History of Radiation Exposure

Issue editors: Jacob Darwin Hamblin & Linda M. Richards

Historical Studies in the Natural Sciences (Vol. 51, Issue 2, April 2021)

Special Issue: Revealing the Michigan Memorial–Phoenix Project

Issue Editors: Joseph D. Martin, Gisela Mateos, David P.D. Munns, Edna Suárez-Díaz
doi:[10.1525/hsns.2021.51.2.169](https://doi.org/10.1525/hsns.2021.51.2.169)

Synthese (Volume 198, Supplement Issue 10, May 2021)

Special Issue: Philosophy of Epidemiology

Issue Editors: Jonathan Michael Kaplan, and Sean A Valles

Astobiza, A. M. (2021). Science, misinformation and digital technology during the Covid-19 pandemic. *History and Philosophy of the Life Sciences*, 43(68), 1-6. doi:[10.1007/s40656-021-00424-4](https://doi.org/10.1007/s40656-021-00424-4)

Bertozzi, E. (2021). ‘Seeing with one’s own eyes’ and speaking to the mind: A history of the Wilson cloud chamber in the teaching of physics. *The British Journal for the History of Science*, 1-17. doi:[10.1017/S0007087421000261](https://doi.org/10.1017/S0007087421000261) online first

Blom, N. & Abrie, A.L. (2021) Students’ perceptions of the nature of technology and its relationship with science following an integrated curriculum. *International Journal of Science Education*. doi:[10.1080/09500693.2021.1930273](https://doi.org/10.1080/09500693.2021.1930273) online first

Duijf, H.(2021). Should one trust experts?. *Synthese*, 1-24. doi:[10.1007/s11229-021-03203-7](https://doi.org/10.1007/s11229-021-03203-7)

online first

Emden, M. (2021). Reintroducing “the” Scientific Method to Introduce Scientific Inquiry in Schools? A Cautioning Plea Not to Throw Out the Baby with the Bathwater. *Sci & Educ*, 1-37. doi:[10.1007/s11191-021-00235-w](https://doi.org/10.1007/s11191-021-00235-w) online first

Eren, E. (2021). Exploring Science Identity Development of Women in Physics and Physical Sciences in Higher Education: A Case Study from Ireland. *Sci & Educ*, 1-28. doi:[10.1007/s11191-021-00220-3](https://doi.org/10.1007/s11191-021-00220-3) online first

Hansen,B. (2021). Pasteur’s lifelong engagement with the fine arts: uncovering a scientist’s passion and personality. *Annals of Science*. doi:[10.1080/00033790.2021.1921275](https://doi.org/10.1080/00033790.2021.1921275) online first

Krashniak, A. (2021). The struggle for life and adaptation by natural selection. *Biol Philos*, 1-16. doi:[10.1007/s10539-021-09803-4](https://doi.org/10.1007/s10539-021-09803-4) online first

Kruse, J., Kent-Schneider, I., Voss, S. et al. (2021). Investigating Student Nature of Science Views as Reflections of Authentic Science: Degrees of Contextualisation and the Teachers’ Role. *Sci & Educ*, 1-21. doi:[10.1007/s11191-021-00231-0](https://doi.org/10.1007/s11191-021-00231-0) online first

Lee, S. W.-Y. et al. (2021). Measuring epistemologies in science learning and teaching: A systematic review of the literature. *Science Education*. doi:[10.1002/sc.21663](https://doi.org/10.1002/sc.21663) online first

Muller, F.A. (2021). The Influence of Quantum Physics on Philosophy. *Found Sci*, 1-12. doi:[10.1007/s10699-020-09725-6](https://doi.org/10.1007/s10699-020-09725-6) online first

Odden,T.O.B., Marin, A., & Rudolph, J. L.(2021). How has Science Education changed over the

- last 100 years? An analysis using natural language processing. *Science Education*, 1-28. doi:[10.1002/sce.21623](https://doi.org/10.1002/sce.21623) online first
- Plaisance, K.S., Graham, A.V., McLevey, J., & Michaud, J. (2021). Show Me the Numbers: A Quantitative Portrait of the Attitudes, Experiences, and Values of Philosophers of Science Regarding Broadly Engaged Work. *Synthese*, 198, 4603-4633. doi:[10.1007/s11229-019-02359-7](https://doi.org/10.1007/s11229-019-02359-7)
- Plaisance, K.S. (2021), Michaud, J., & McLevey, J. (2021). Pathways of Influence: Understanding the Impacts of Philosophy of Science in Scientific Domains. *Synthese*, 1-32. doi:[10.1007/s11229-020-03007-1](https://doi.org/10.1007/s11229-020-03007-1) online first
- Plaisance, K.S. (2020), "The Benefits of Acquiring Interactional Expertise: Why (Some) Philosophers of Science Should Engage Scientific Communities. *Studies in History and Philosophy of Science Part A*, 83, 53-62. doi:[10.1016/j.shpsa.2020.03.002](https://doi.org/10.1016/j.shpsa.2020.03.002)
- Portugal, K.O., Arruda, S.d. & Passos, M.M. (2021). Strands of Science Teaching: A Tool for the Analysis of Science Teaching Venues. *Sci & Educ*, 1-23. doi:[10.1007/s11191-021-00213-2](https://doi.org/10.1007/s11191-021-00213-2) online first
- Quílez, J. (2021). Le Châtelier's Principle a Language, Methodological and Ontological Obstacle: An Analysis of General Chemistry Textbooks. *Sci & Educ*, 1-36. doi:[10.1007/s11191-021-00214-1](https://doi.org/10.1007/s11191-021-00214-1) online first
- Reydon, T.A.C.(2021). Misconceptions, conceptual pluralism, and conceptual toolkits: bringing the philosophy of science to the teaching of evolution. *Euro Jnl Phil Sci*, 1-13. doi:[10.1007/s13194-021-00363-8](https://doi.org/10.1007/s13194-021-00363-8) online first
- Serpico, D. (2021). The Cyclical Return of the IQ Controversy: Revisiting the Lessons of the Resolution on Genetics, Race and Intelligence. *J Hist Biol*, 1-30. doi:[10.1007/s10739-021-09637-6](https://doi.org/10.1007/s10739-021-09637-6) online first
- Sztejnberg, A. (2021). Albert Ladenburg (1842-1911) – The Distinguished German Chemist and Historian of Chemistry of the Second Half of the XIX Century (To the 110th Anniversary of His Death). *Substantia*. doi:[10.36253/Substantia-1231](https://doi.org/10.36253/Substantia-1231) just accepted
- Tseng, A S., Bonilla, S., & MacPherson, A. (2021). Fighting "bad science" in the information age: The effects of an intervention to stimulate evaluation and critique of false scientific claims. *Journal of Research in Science Teaching*. doi:[10.1002/tea.21696](https://doi.org/10.1002/tea.21696) online first
- Upahi, J.E., Ramnarain, U. (2021). Evidence of Foundational Knowledge and Conjectural Pathways in Science Learning Progressions: A Review of Research. *Sci & Educ*, 1-38. doi:[10.1007/s11191-021-00226-x](https://doi.org/10.1007/s11191-021-00226-x) online first
- Voss, S., Kruse, J. & Kent-Schneider, I. (2021). Comparing Student Responses to Convergent, Divergent, and Evaluative Nature of Science Questions. *Res Sci Educ*, 1-15. doi:[10.1007/s11165-021-10009-7](https://doi.org/10.1007/s11165-021-10009-7) online first
- Zhuang, H., Xiao,Y. Liu, Q., Yu, B., Xiong, J., & Bao, L.(2021) Comparison of nature of science representations in five Chinese high school physics textbooks. *International Journal of Science Education*. doi:[10.1080/09500693.2021.1933647](https://doi.org/10.1080/09500693.2021.1933647)

online first

Recent HPS&ST Related Books

Buchwald, Diana K. (Ed.) (2021). *The Collected Papers of Albert Einstein, Volume 16 (Documentary Edition): The Berlin Years / Writings & Correspondence / June 1927–May 1929*. Princeton, NJ: Princeton University Press. ISBN: 978-0-691-21681-2

“During the period covered by this volume, Einstein aims to discover whether one can derive the electron’s equations of motion directly from the field equations of general relativity, and he embarks on a new approach to unified field theory founded on teleparallel geometry. On these topics, he engages in exchanges with J. Grommer, C. Lanczos, and particularly with C. H. Müntz, and corresponds with mathematicians like R. Weitzenböck and É. Cartan.

“Einstein attends what will be considered a historic 1927 Solvay Conference where the new quantum mechanics is discussed, but in fact he makes very few remarks. In an important prelude to his eventual emigration to the United States, he is invited in September 1927 to accept a research professorship at Princeton University.

“Despite the sudden onset of a severe heart ailment in 1928, followed by an almost year-long period of convalescence, Einstein maintains a sustained engagement with scientific work, correspondence, and social and political issues. He publishes many articles and interviews designed for a popular audience and continues various technical preoccupations, including publishing a patent for a novel “people’s” refrigerator and being intimately involved in the design of his famous sailboat.

“Einstein advocates for domestic legislative reform, gay and minority rights, European rapprochement, and conscientious objection to military service. He resigns from his positions at the Hebrew University.

He also tries to avoid the fanfare marking his fiftieth birthday in March 1929 yet is “buried under a paper avalanche” from the tributes.

“His hiring of Helen Dukas as his assistant, who accompanies Einstein to the end of his life, is of great significance for the ultimate preservation of his written legacy.” (From the Publisher)

More information available [here](#).

Friendly, Michael & Wainer, Howard (2021). *A History of Data Visualization and Graphic Communication*. Cambridge, MA: Harvard University Press.

ISBN: 978-0-674-97523-1

“With complex information everywhere, graphics have become indispensable to our daily lives. Navigation apps show real-time, interactive traffic data. A colour-coded map of exit polls details election balloting down to the county level. Charts communicate stock market trends, government spending, and the dangers of epidemics. *A History of Data Visualisation and Graphic Communication* tells the story of how graphics left the exclusive confines of scientific research and became ubiquitous. As data visualisation spread, it changed the way we think.

“Michael Friendly and Howard Wainer take us back to the beginnings of graphic communication in the mid-seventeenth century, when the Dutch cartographer Michael Florent van Langren created the first chart of statistical data, which showed estimates of the distance from Rome to Toledo. By 1786 William Playfair had invented the line graph and bar chart to explain trade imports and exports. In the nineteenth century, the “golden age” of data display, graphics found new uses in tracking disease outbreaks and understanding social issues. Friendly and Wainer make the case that the explosion in graphical communication both reinforced and was advanced by a cognitive revolution: visual thinking.

Across disciplines, people realised that information could be conveyed more effectively by visual displays than by words or tables of numbers.

“Through stories and illustrations, *A History of Data Visualization and Graphic Communication* details the 400-year evolution of an intellectual framework that has become essential to both science and society at large.” (From the Publisher)

More information available [here](#).

Gordin, Michael D. (2021). *On the Fringe: Where Science Meets Pseudoscience*. Oxford, UK: Oxford University Press. ISBN: 978-0-197-55576-7

“Everyone has heard of the term “pseudoscience”, typically used to describe something that looks like science, but is somehow false, misleading, or unproven. Many would be able to agree on a list of things that fall under its umbrella—astrology, phrenology, UFOlogy, creationism, and eugenics might come to mind. But defining what makes these fields “pseudo” is a far more complex issue. It has proved impossible to come up with a simple criterion that enables us to differentiate pseudoscience from genuine science. Given the virulence of contemporary disputes over the denial of climate change and anti-vaccination movements—both of which display allegations of “pseudoscience” on all sides—there is a clear need to better understand issues of scientific demarcation.

“*On the Fringe* explores the philosophical and historical attempts to address this problem of demarcation. This book argues that by understanding doctrines that are often seen as antithetical to science, we can learn a great deal about how science operated in the past and does today. This exploration raises several questions: How does a doctrine become demonised as pseudoscientific? Who has the authority to make these pronouncements? How is the status of science shaped by political or cultural

contexts? How does pseudoscience differ from scientific fraud?

“Michael D. Gordin both answers these questions and guides readers along a bewildering array of marginalised doctrines, looking at parapsychology (ESP), Lysenkoism, scientific racism, and alchemy, among others, to better understand the struggle to define what science is and is not, and how the controversies have shifted over the centuries. *On the Fringe* provides a historical tour through many of these fringe fields in order to provide tools to think deeply about scientific controversies both in the past and in our present.” (From the Publisher)

More information available [here](#).

Hüttemann, A. (2021). *A Minimal Metaphysics for Scientific Practice*. Cambridge: Cambridge University Press. ISBN: 978-1-009-02354-2

“What are the metaphysical commitments which best ‘make sense’ of our scientific practice (rather than our scientific theories)? In this book, Andreas Hüttemann provides a minimal metaphysics for scientific practice, i.e. a metaphysics that refrains from postulating any structure that is explanatorily irrelevant. Hüttemann closely analyses paradigmatic aspects of scientific practice, such as prediction, explanation and manipulation, to consider the questions whether and (if so) what metaphysical presuppositions best account for these practices. He looks at the role which scientific generalisation (laws of nature) play in predicting, testing, and explaining the behaviour of systems. He also develops a theory of causation in terms of quasi-inertial processes and interfering factors, and he proposes an account of reductive practices that makes minimal metaphysical assumptions. His book will be valuable for scholars and advanced students working in both philosophy of science and metaphysics.” (From the Publisher)

More information available [here](#).

Lyons, Timothy D., & Peter Vickers (Eds.) (2021). *Contemporary Scientific Realism: The Challenge from the History of Science*. Oxford, UK: Oxford University Press.
ISBN: 978-0-190-94681-4

“Scientific realists claim we can justifiably believe that science is getting at the truth. However, they have faced historical challenges: various episodes across history appear to demonstrate that even strongly supported scientific theories can be overturned and left behind. In response, realists have developed new positions and arguments. As a result of specific challenges from the history of science, and realist responses, we find ourselves with an ever-increasing dataset bearing on the (possible) relationship between science and truth.

“The present volume introduces new historical cases impacting the debate and advances the discussion of cases that have only very recently been introduced. At the same time, shifts in philosophical positions affect the very kind of case study that is relevant. Thus, the historical work must proceed hand in hand with philosophical analysis of the different positions and arguments in play. It is with this in mind that the volume is divided into two sections, entitled “Historical Cases for the Debate” and “Contemporary Scientific Realism.”

“All sides agree that historical cases are informative with regard to how, or whether, science connects with truth. Defying proclamations as early as the 1980s announcing the death knell of the scientific realism debate, here is that rare thing: a philosophical debate making steady and definite progress. Moreover, the progress it is making concerns one of humanity’s most profound and important questions: the relationship between science and truth, or, put more boldly, the epistemic relation between humankind and the reality in which we find ourselves.” (From the Publisher)

More information available [here](#).

McGrath, Alister E. (2021). *The Territories of Human Reason: Science and Theology in an Age of Multiple Rationalities*. Oxford, UK: Oxford University Press. ISBN: 978-0-192-84568-9 [New in Paperback]

“Our understanding of human rationality has changed significantly since the beginning of the century, with growing emphasis being placed on multiple rationalities, each adapted to the specific tasks of communities of practice. We may think of the world as an ontological unity - but we use a plurality of methods to investigate and represent this world. This development has called into question both the appeal to a universal rationality, characteristic of the Enlightenment, and also the simple ‘modern-postmodern’ binary. *The Territories of Human Reason* is the first major study to explore the emergence of multiple situated rationalities. It focuses on the relation of the natural sciences and Christian theology, but its approach can easily be extended to other disciplines. It provides a robust intellectual framework for discussion of trans-disciplinarity, which has become a major theme in many parts of the academic world.

“Alister E. McGrath offers a major reappraisal of what it means to be ‘rational’ which will have significant impact on older discussions of this theme. He sets out to explore the consequences of the seemingly inexorable move away from the notion of a single universal rationality towards a plurality of cultural and domain-specific methodologies and rationalities. What does this mean for the natural sciences? For the philosophy of science? For Christian theology? And for the interdisciplinary field of science and religion? How can a single individual hold together scientific and religious ideas, when these arise from quite different rational approaches? This ground-breaking volume sets out to engage these questions and will provoke intense dis-

cussion and debate.” (From the Publisher)

More information available [here](#).

Natale, Simone (2021). *Deceitful Media: Artificial Intelligence and Social Life after the Turing Test*. Oxford, UK: Oxford University Press.
ISBN: 978-0-190-08037-2 [Paperback]

“Artificial intelligence (AI) is often discussed as something extraordinary, a dream—or a nightmare—that awakens metaphysical questions on human life. Yet far from a distant technology of the future, the true power of AI lies in its subtle revolution of ordinary life. From voice assistants like Siri to natural language processors, AI technologies use cultural biases and modern psychology to fit specific characteristics of how users perceive and navigate the external world, thereby projecting the illusion of intelligence.

“Integrating media studies, science and technology studies, and social psychology, *Deceitful Media* examines the rise of artificial intelligence throughout history and exposes the very human fallacies behind this technology. Focusing specifically on communicative AIs, Natale argues that what we call “AI” is not a form of intelligence but rather a reflection of the human user. Using the term “banal deception,” he reveals that deception forms the basis of all human-computer interactions rooted in AI technologies, as technologies like voice assistants utilise the dynamics of projection and stereotyping as a means for aligning with our existing habits and social conventions. By exploiting the human instinct to connect, AI reveals our collective vulnerabilities to deception, showing that what machines are primarily changing is not other technology but ourselves as humans.

“*Deceitful Media* illustrates how AI has continued a tradition of technologies that mobilise our liability to deception and shows that only by better under-

standing our vulnerabilities to deception can we become more sophisticated consumers of interactive media” (From the Publisher)

More information available [here](#).

Perillán, José G. (2021). *Science Between Myth and History: The Quest for Common Ground and Its Importance for Scientific Practice*. Oxford, UK: Oxford University Press.
ISBN: 978-0-198-86496-7

“Scientists regularly employ historical narrative as a rhetorical tool in their communication of science, yet there’s been little reflection on its effects within scientific communities and beyond. *Science Between Myth and History* begins to unravel these threads of influence. The stories scientists tell are not just poorly researched scholarly histories, they are myth-histories, a chimeric genre that bridges distinct narrative modes. This study goes beyond polarising questions about who owns the history of science and establishes a common ground from which to better understand the messy and lasting legacy of the stories scientists tell. It aims to stimulate vigorous conversation among science practitioners, scholars, and communicators.

“Scientific myth-histories undoubtedly deliver value, coherence, and inspiration to their communities. They are tools used to broker scientific consensus, resolve controversies, and navigate power dynamics. Yet beyond the explicit intent and rationale behind their use, these narratives tend to have great rhetorical power and social agency that bear unintended consequences. This book unpacks the concept of myth-history and explores four case studies in which scientist storytellers use their narratives to teach, build consensus, and inform the broader public. From geo-politically informed quantum interpretation debates to high-stakes gene-editing patent disputes, these case stud-

ies illustrate the implications of storytelling in science.

“*Science Between Myth and History* calls on scientists not to eschew writing about their history, but to take more account of the stories they tell and the image of science they project. In this time of eroding common ground, when many find themselves dependent on, yet distrustful of scientific research, this book interrogates the effects of mismatched, dissonant portraits of science.” (From the Publisher)

More information available [here](#).

Sterelny, Kim (2021). *The Pleistocene Social Contract: Culture and Cooperation in Human Evolution*. Oxford, UK: Oxford University Press.

ISBN: 978-0-197-53138-9

“Kim Sterelny here builds on his original account of the evolutionary development and interaction of human culture and cooperation, which he first presented in *The Evolved Apprentice* (2012). Sterelny sees human evolution not as hinging on a single key innovation, but as emerging from a positive feedback loop caused by smaller divergences from other great apes, including bipedal locomotion, better causal and social reasoning, reproductive cooperation, and changes in diet and foraging style. He advances this argument in *The Pleistocene Social Contract* with four key claims about cooperation, culture, and their interaction in human evolution.

“First, he proposes a new model of the evolution of human cooperation. He suggests human cooperation began from a baseline that was probably similar to that of great apes, advancing about 1.8 million years ago to an initial phase of cooperative forging, in small mobile bands. Second, he then presents a novel account of the change in evolutionary dynamics of cooperation: from cooperation profits based

on collective action and mutualism, to profits based on direct and indirect reciprocity over the course of the Pleistocene. Third, he addresses the question of normative regulation, or moral norms, for band-scale cooperation, and connects it to the stabilisation of indirect reciprocity as a central aspect of forager cooperation. Fourth, he develops an account of the emergence of inequality that links inequality to intermediate levels of conflict and cooperation: a final phase of cooperation in large-scale, hierarchical societies in the Holocene, beginning about 12,000 years ago.

“*The Pleistocene Social Contract* combines philosophy of biology with a reading of the archaeological and ethnographic record to present a new model of the evolution of human cooperation, cultural learning, and inequality.” (From the Publisher)

More information available [here](#).

Waide, Robert B., & Kingsland, Sharon E. (2021). *The Challenges of Long Term Ecological Research: A Historical Analysis*. Cham: Springer.

ISBN: 978-3-030-66935-5

“This volume explores the challenges of sustaining long-term ecological research through a historical analysis of the Long Term Ecological Research Program created by the U.S. National Science Foundation in 1980. The book examines reasons for the creation of the Program, an overview of its 40-year history, and in-depth historical analysis of selected sites. Themes explored include the broader impact of this program on society, including its relevance to environmental policy and understanding global climate change, the challenge of extending ecosystem ecology into urban environments, and links to creative arts and humanities projects. A major theme is the evolution of a new type of network science, involving compar-

ative studies, innovation in information management, creation of socio-ecological frameworks, development of governance structures, and formation of an International Long Term Ecological Research Network with worldwide reach. The book's themes will interest historians, philosophers and social scientists interested in ecological and environmental sciences, as well as researchers across many disciplines who are involved in long-term ecological research." (From the Publisher)

More information available [here](#).

Wray, K. (Ed.). (2021). *Interpreting Kuhn: Critical Essays*. Cambridge: Cambridge University Press. ISBN: 978-1-108-65320-6

"*Interpreting Kuhn* provides a comprehensive, up-to-date study of Thomas Kuhn's philosophy and legacy. With twelve essays newly written by an international group of scholars, it covers a wide range of topics where Kuhn had an influence. Part I deals with foundational issues such as Kuhn's metaphysical assumptions, his relationship to Kant and Kantian philosophy, as well as contextual influences on his writing, including Cold War psychology and art. Part II tackles three Kuhnian concepts: normal science, incommensurability, and scientific revolutions. Part III deals with the Copernican Revolution in astronomy, the theory-ladenness of observation, scientific discovery, Kuhn's evolutionary analogies, and his theoretical monism. The volume is an ideal resource for advanced students seeking an overview of Kuhn's philosophy, and for specialists following the development of Kuhn scholarship." (From the Publisher)

More information available [here](#).

Authors of HPS&ST-related papers and books are invited to bring them to attention of [Paulo Maurício](#) or [Nathan Oseroff-Spicer](#) for inclusion in these sections.

Coming HPS&ST Related Conferences

June 4, 2021, Conceptual Change: Bridging the Gap Between History and Philosophy of Science (HPS) and Science Education, Utrecht University
Information available [here](#).

July 11-16, 2021, Biennial meeting of the International Society for the History, Philosophy, and Social Studies of Biology, Milwaukee, WI
Details available [here](#).

July 19-23, 2021 'Objects of Understanding: Historical Perspectives on Material Artefacts in Science Education' will take place at the Europa-Universität Flensburg (Germany)
Details: Roland Wittje, roland.wittje@gmail.com and [here](#).

July 25-31, 2021, 26th International Congress of History of Science and Technology (DHST), Prague. (WEB CONFERENCE)
Information: <https://www.ichst2021.org/>

September 8-10, 2021 Conference, *Société de philosophie des sciences* University of Mons, Belgium
Inquiries: Antoine Brandelet (antoine.brandelet@umons.ac.be)

July 3rd-7th, 2022, IHPST 16th International Conference, University of Calgary, Canada
Details from Glenn Dolphin: glenn.dolphin@ucalgary.ca.

July 24-29, 2023, 17th DLMPST Congress, Univer-

sity of Buenos Aires Information: Pablo Lorenzani, pablo@unq.edu.ar.

HPS&ST Related Organisations and Websites

IUHPST – International Union of History, Philosophy, Science, and Technology

DLMPST – Division of Logic, Mathematics, Philosophy, Science, and Technology

DHST – Division of History, Science, and Technology

IHPST – International History, Philosophy, and Science Teaching Group

NARST – National Association for Research in Science Teaching

ESERA – European Science Education Research Association

ASERA – Australasian Science Education Research Association

ICASE – International Council of Associations for Science Education

UNESCO – Education

HSS – History of Science Society

ESHS – European Society for the History of Science

AHA – American History Association

ISHEASTME – International Society for the History of East Asian History of Science Technology and Medicine

BSHS – British Society for History of Science

EPSA – European Philosophy of Science Association

AAHPSSS - The Australasian Association for the History, Philosophy, and Social Studies of Science

HOPOS – International Society for the History of Philosophy of Science

PSA – Philosophy of Science Association

BSPS – The British Society for the Philosophy of Science

SPSP – The Society for Philosophy of Science in Practice

ISHPSB – The International Society for the History, Philosophy, and Social Studies of Biology

PES – The Philosophy of Education Society (USA)

The above list is updated and kept on the HPS&ST website [HERE](#).

HPS&ST-related organisations wishing their web page to be added to the list should contact assistant editor Paulo Maurício (paulo.asterix@gmail.com)

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