

HPS&ST Newsletter
December 2024
Vol.37 (11)
ISSN: 2652-2837

CONTENTS

# Introduction	1
# Linda Hall Library Fellowships	1
# IUHPST Commission on Science and Literature: Asia Programme	3
# British Society for the History of Science: Outreach and Engagement Grants	3
# 27th International Congress of History of Science and Technology, Dunedin, June 29-July 5, 2025	3
# The HPS Podcast	4
# PhilSci Archive - Top 5 Downloads + Books	4
# OPINION PAGE: <i>The nature of natural laws</i>	
MARIO HUBERT, Philosophy, Ludwig-Maximilians-University Munich.	5
# Varia	9
# Featured Book <i>Chemistry's Metaphysics</i>, Vanessa A. Seifert	9
# Golden Oldie: HPS&ST Research from 30+ Years Ago	10
De Berg, K.C.: 1992, 'Mathematics in Science: The Role of the History of Science in Communicating the Significance of Mathematical Formalism in Science'	
# Recent HPS&ST Research Articles	10
# Recent HPS&ST Related Books	11
# PhD Awarded in HPS&ST	15
# Coming HPS&ST Related Conferences	15
# HPS&ST Related Organisations and Websites	16
# HPS&ST Newsletter Personnel	16

Introduction

The HPS&ST Newsletter is sent monthly to about 11,000 emails of 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, along with RESOURCES, OBITUARIES, OPINION PIECES and more, are lodged at the website: [HERE](#)

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 (publications, conferences, Opinion7Piece, etc.) are welcome and should be sent direct to the editor: Michael R. Matthews, UNSW, m.matthews@unsw.edu.au .

Linda Hall Library Fellowships

The [Linda Hall Library](#) is now accepting applications for our 2025-26 fellowship program. These fellowships provide graduate students, postdoctoral researchers, and independent scholars in the history of science and related humanities

fields with financial support to explore the Library's outstanding science and engineering collections. Fellows also participate in a dynamic intellectual community alongside in-house experts and scholars from other Kansas City cultural and educational institutions.

The Linda Hall Library holds nearly half a million monographs and more than 43,000 journal titles documenting the history of science and technology from the 15th century to the present. Its collections are exceptionally strong in the engineering disciplines, chemistry, and physics. In addition, the Library boasts extensive resources related to natural history, astronomy, earth science, environmental studies, aeronautics, life science, infrastructure studies, mathematics, and the history of the book.



The Library offers **residential fellowships** to support on-site research in Kansas City, as well as **virtual fellowships** for scholars working remotely using resources from the Library's digital collections. Applicants may request up to four months of funding at a rate of \$3,000 per month for doctoral students and \$4,200 per month for postdoctoral researchers.



The Library is also offering several fellowships intended for specific groups of researchers:

- The **National Endowment for the Humanities Fellowship** provides nine months of residential funding (\$5,000 per month) to a postdoctoral scholar whose research explores the intersection of science and the humanities.
- The **History of Science and Medicine Fellowship**, offered in partnership with the [Clendening History of Medicine Library](#) at the University of Kansas Medical Center, provides one month of residential funding (\$3,000 per month) to a doctoral student whose research examines the intersecting histories of science and medicine.
- The **Pearson Fellowship in Aerospace History** provides up to two months of residential funding (\$4,200 per month) to a postdoctoral scholar studying the history of aviation or spaceflight.
- The **Presidential Fellowship in Bibliography** provides up to four months of residential funding (\$4,200 per month) to a postdoctoral scholar whose research focuses on the study of books and manuscripts as physical artifacts.

Further details about the Linda Hall Library's 2025-26 fellowships can be found on our website: <https://lindahall.org/fellowships>. While you are there, you can submit an application or sign up for our online information sessions on [December 17, 2024](#) and [January 3, 2025](#).

You are also welcome to email questions directly to fellowships@lindahall.org. Please note that all application materials, including recommendation letters, are due no later than **January 17, 2025**.

IUHPST Commission on Science and Literature: Asia Programme

Our representative in Korea, Gi Taek Ryoo, has organised a Symposium on Science with/in Literature which will be taking place at Chungbuk National University in Korea on 16 December. If you would like to attend this symposium (in person only) or hear more about it, you are very welcome to contact G.T. (gtryoo@chungbuk.ac.kr).

INTERNATIONAL SYMPOSIUM :SCIENCE WITH/IN LITERATURE

Chungbuk National University, Korea
December 16(M), 2024. 14:00 - 17:30
College of Humanities (Room 123)



Elisabetta Di Minico
Complutense University of Madrid, Spain



Lilith Acadia
National Taiwan University, Taiwan



Myles Chilton
Nihon University, Japan



Neil Addison
Japan Women's University, Japan



Sumin Kim
Seoul National University, Korea



Scott Jordan
Illinois State University, U.S.A



Our representative in Japan, Neil Addison, has also organised a panel on Rethinking Science and Literature in a Global Context at the upcoming conference of the English Language and Literature Association of Korea (ELLAK), which is taking place at Seoul National University on 12-14 December. You can find details on the conference [here](#) and download the full programme [here](#).

John Holmes, Professor of Victorian Literature and Culture, University of Birmingham, Birmingham B15 2TT

British Society for the History of Science: Outreach and Engagement Grants

The British Society for the History of Science's Outreach and Engagement Committee offers grants of up to £500 to support engagement and outreach projects in the history of science, technology and medicine. Project grants are awarded three times per year, and the deadline for the next round is **Friday 14 February 2025**.

Project grants are intended to support initiatives that encourage engagement with the history of science, technology and medicine by non-academic audiences. For example, eligible projects might include supporting the costs of holding a public event, the creation of a public display, or the translation of research into educational resources. We particularly encourage projects that use innovative formats and reach audiences that might be new to the history of science, technology and medicine.

Further information, and a downloadable application form, can be found at: <https://www.bsbs.org.uk/grants/outreach-and-engagement-project-grants>

Allan Jones
allan.jones@open.ac.uk

27th International Congress of History of Science and Technology, Dunedin, June 29- July 5, 2025



The 27th International Congress of History of Science and Technology will be held from **29 June - 5 July 2025** at the University of Otago in Dunedin, New Zealand.

Symposium Proposals due by 1 May 2024.
Standalone Papers due by 1 December 2024.

The International Congress of History of Science and Technology (ICHST), held every four years, is the world's premier meeting for history of science and technology. The 27th Congress will be held as a hybrid in-person and online event at the University of Otago's Dunedin campus in June-July 2025. Delegates registered for virtual participation will be able to both present and attend online. The Congress will bring together a diverse group of the world's leading scholars and students in the fields of history of science, technology, and medicine as well as related disciplines. It will be the first time the Congress has been held in Australasia and only the second time in the Southern Hemisphere.

The **theme** of the 27th ICHST is "Peoples, Places, Exchanges, and Circulation."



Details [HERE](#)

The HPS Podcast

The HPS Podcast - Conversations from History, Philosophy and Social Studies of Science
Leading scholars in History, Philosophy and Social Studies of Science (HPS) introduce contemporary topics for a general audience.

Developed by scholars and students in the HPS program at the University of Melbourne.
Producers and Hosts: Samara Greenwood and Carmelina Contarino.

[S4 Ep 2 - Simon Schaffer on 'Leviathan and the Air-Pump: 40 years later' \(Part 1\)](#)

[S4 Ep 2 - Simon Schaffer on 'Leviathan and the Air-Pump: 40 years later' \(Part 1\)](#)

[S4 Ep 7 - Naomi Oreskes on 'Writing on Ignorance'](#)

[S4 Ep 8 - Nicole C. Nelson on 'Ethnographies of Science'](#)

[S4 Ep 9 - Holden Thorp on 'Teach History and Philosophy of Science'](#)

Holden Thorp is Editor-in-Chief of Science and is on a campaign to promote more teaching of History and Philosophy of Science to science students at secondary and tertiary levels.

If you prefer to read the interviews, we publish transcripts of all our episodes (some a little delayed) on our blog here - [Podcast Transcripts](#).

Samara Greenwood

PhD Candidate

Co-Host of [The HPS Podcast](#)

PhilSci Archive - Top 5 Downloads + Books

PhilSci-Archive is the official preprint repository for the PSA and the best place to host your philosophy of science preprints. It offers a free, stable, and openly accessible archive for scholarly articles and monographs.

Downloadable books are available [HERE](#)

The most downloaded preprints for the last six months of articles deposited in the previous two years are:

[Cobb, David \(2022\) Empiricism in the Philosophy of Science](#)

[Wiggleton-Little, Jada and Callender, Craig \(2022\) Screening Out Neurodiversity](#)

[Chen, Eddy Keming \(2023\) Laws of Physics](#)

[Ardourel, Vincent and Bangu, Sorin \(2023\) Finite-size scaling theory: Quantitative and qualitative approaches to critical phenomena](#)

[Stern, Julio Michael and Pereira, Carlos Alberto de Braganca and Lauretto, Marcelo de Souza](#)

[and Esteves, Luis Gustavo and Izbicki, Rafael and Stern, Rafael Bassi and Diniz, Marcio Alves and Borges, Wagner de Souza \(2023\) The e-value and the Full Bayesian Significance Test: Logical Properties and Philosophical Consequences](#)

Opinion Page: *The nature of natural laws**

MARIO HUBERT

Philosophy, Ludwig-Maximilians-University Munich.

Mario Hubert earned a Diploma (equivalent to MSc) in mathematics from LMU Munich in 2013 and completed his PhD in philosophy in 2017 at the University of Lausanne, Switzerland. He was postdoctoral fellow at Columbia University and New York University. From 2019 to 2022, he was the *Howard E. and Susanne C. Jessen Postdoctoral Instructor in Philosophy of Physics* at Caltech. From 2022 until 2024, he was Assistant Professor of Philosophy at the American University in Cairo.



Since 2014, he has been Assistant Professor of Philosophy at the LMU Munich. His co-authored article ‘When Fields Are Not Degrees of Freedom’ received an Honorable Mention at the 2021 Popper Prize in the *British Journal for the Philosophy of Science*.

THE SUN RISES EVERY DAY. Water boils at 100°C. Apples fall to the ground. We live in a world in which objects behave the same given the same circumstances. We can imagine living in a different world: a world that constantly changes, a world in which the Sun does not rise every day, a world in which water one day boils at 50°C, and at 120°C another day, a world in which apples sometimes fall from trees and sometimes rise into the sky. Only because we live in a world that displays stable regularities are we able to reliably shape our environment and plan our lives.

We have an intuition that these regularities are due to laws of nature, but we normally do not interrogate what these laws are and how they work in any basic metaphysical sense. Instead, we assume that science not only provides these laws but also elucidates their structure and metaphysical status, even when the answers seem partial at best.

In short, we assume that, thanks to science, there is a recipe of sorts for how the laws of nature work. You take the state of the Universe at a given moment – every single fact about every single aspect of it – and combine it with the laws of nature, then assume that these will reveal, or at least determine, the state of the Universe in the moment that comes next.

Layer-cake Model

I refer to this as the layer-cake model of the Universe, which dates back to the 17th-century philosopher René Descartes. Not long after Descartes embraced the idea of a deterministic universe, Isaac Newton presented a mathematical law for gravitation, which gave the concept a powerful quantitative update. The gravitational force on one body at one time is determined by the location of all the bodies in the Universe at that time; the state of the Universe plus the law of gravitation tells you how all bodies will move: a layer-cake model, indeed.

The influence of Descartes and Newton on how we think about laws of nature is immense – and not without justification. It has helped to unify whole fields of physics, including mechanics, gravitation and electromagnetism. It is still so widespread in the scientific community, and it has

such a distinguished pedigree, that scientists may not even realise that they subscribe to the layer-cake model at all.

But the uncomfortable truth is that there are many aspects of modern physics that seem to provide counterexamples to the layer-cake model. To date, some of these alternatives have occupied only a rogue niche in physics. But they should be studied more deeply and understood more widely because they pose major challenges to our fundamental understanding of the Universe – how it began, where it is going, and what kind of entity, if any, is driving it.

The first massive challenge to the layer-cake model, Albert Einstein's theory of general relativity, appeared in the 20th century. The laws of nature that are core to the theory of general relativity, the Einstein field equations, do not immediately lend themselves to the layer-cake model at all.

The difference can be seen in the structure of the mathematics itself. An equation that adheres to the layer-cake model describes the changes that occur in space in terms of the underlying reasons for these changes. For example, Newton's equation for his second law of motion describes the acceleration of physical bodies in terms of the underlying forces causing that acceleration. The Einstein field equations, on the other hand, describe the very structure of spacetime as the change agent for moving physical bodies; in fact, most of the solutions to the Einstein field equations yield a spacetime structure that is incompatible with the layer-cake model.

When faced with this challenge, physicists do something highly revealing: they specifically search for solutions to the Einstein field equations that comport with the layer-cake model, and they rule out solutions that do not comport with the model as 'unphysical' – as artefacts of the mathematics that do not tell us anything about reality, or, at least, not the reality we live in.

Does the Future influence the Past?

In the case of general relativity, there are good reasons for doing this, but in other cases the challenge to the layer-cake model becomes harder

to dismiss. In classical mechanics, for example, there is something called the Lagrangian formulation, which holds that, when moving between two separate points, A and B, a physical body will take the most efficient path. This does not look like the layer-cake model because, in order for the physical body to take the path of maximal efficiency, point B, which lies in the future, needs to be determined in advance. It looks, counterintuitively, as if the future is what determines the motion of the body in the past.

As strange as this seems, it turns out that you can derive the familiar Newtonian equations for motion from the Lagrangian formulation. Because of this, scientists often treat the Newtonian version, which comports with the layer-cake theory, as reflecting the true structure of the world. The Lagrangian version is understood to be an interesting and sometimes practical – but never metaphysically accurate – mathematical reformulation.

But the Lagrangian formulation is just the start. Physics has many other theories where the future seems to somehow influence the past. The peculiarities of quantum mechanics have led to the development of so-called [retro-causal models](#). And such midcentury giants of physics as John Archibald Wheeler and Richard Feynman developed a [theory](#) of classical electromagnetism that basically says that future charges send light signals into the past.

I do not claim that any of these alternatives to the layer-cake model of the Universe is correct, but they are worthy of deeper study. The door has been opened for an investigation of alternative ways of how laws act in the Universe.

How do Laws influence the World?

In current philosophy, the layer-cake model has been defended by the philosopher [Tim Maudlin](#), a professor at New York University. In his [book](#) *The Metaphysics Within Physics* (2007), he lists two key metaphysical features: laws are primitive entities, and laws produce the future from the state of the present. In this context, 'primitive' means non-reducible to anything else, or standing on its own. Primitive laws thus exist by themselves, and they exist not as concrete objects, like tables or

cars, that we can experience and manipulate with our senses, but rather as abstract entities, similar to numbers. An immediate problem arises: how can laws influence any physical object in the world?

In principle, we face a similar issue with legal laws: how can these abstract laws that are passed by Congress influence our behaviour? But the answer is straightforward: once we get notice of a law and understand it, we can choose to abide by it. The fact that we can choose to follow the law means that we have freedom not to follow the law.

Laws of nature are different. An electron has no freedom not to follow the laws (even if they are indeterministic), and, more importantly, it is utterly mysterious how laws as primitive abstract entities are able to tell the electron what to do.

Two Davids: Lewis and Hume

In order to mitigate this problem of how electrons are able to obey the laws, another conception of laws was proposed by the philosopher David Lewis, which has been dubbed Humeanism about laws, in reminiscence of David Hume.

In *An Enquiry Concerning Human Understanding* (1748), Hume posed the following problem about the notion of causation. He illustrated the problem with the collision of billiard balls. When billiard ball A hits billiard ball B, which was initially at rest, we observe that billiard ball B moves after the collision; we say that billiard ball A caused billiard ball B to move. This seems to be unproblematic. At least, we know that, due to the causal relation between the two billiard balls, whenever billiard ball A hits billiard B, billiard ball B would move. But how does causation bind the motion of billiard ball A to the change of motion in billiard ball B so that billiard ball B always behaves the same when billiard ball A collides with it?

For Hume, this question has no answer. We, as human beings, cannot directly observe this causal binding; all that we can observe is the constant motion of billiard ball A and the successive motion of billiard ball B. And that is all that we can be confident of saying about causation.

Lewis took this epistemic conclusion and turned it into an ontological one. Not only do we not experience how exactly laws influence physical objects, now it is said that the laws of nature do not influence or produce anything in the world. The layer-cake model is utter fiction. Instead, laws of nature effectively describe what is happening in the world. They describe the facts in the world, like a newspaper article reports facts in the world. Therefore, to emphasise the main idea of this proposal, I will call it the newspaper model of laws of nature.

Newspaper Model of Laws

The newspaper model is probably the most popular theory of laws of nature among professional philosophers, and it attracts a lot of active [research](#) right now. It is so attractive because it is metaphysically thin: there are no mysterious, unexplained relations of production as demanded in the layer-cake model. Laws merely summarise the history of physical objects.

The newspaper model, however, faces its own problem. Since there is no causal relation binding objects in the world, there is no reason why billiard ball B ought to move when being hit by billiard ball A. It may just remain at rest or move without being hit or break into parts or just vanish into thin air. Anything goes. If that were the case, the laws of nature would constantly change because they describe changing facts in the world. And still, billiard ball B always behaves the same way, and the laws remain the same too. How does that happen?

The metaphysical thinness has to be bought with Hume's [principle](#) of the uniformity of nature. It is a primitive unexplained fact within the newspaper model that the world always behaves the same way; billiard ball B always moves the same way when being hit by billiard ball A, even if nothing tells billiard ball B to behave so. Lewis reiterated Hume when he [wrote](#) that 'if nature is kind to us, the problem needn't arise.' In other words, just as in the layer-cake model, the laws of nature also remain the same over time and keep their structure in the newspaper model.

For example, Newton's laws remain as they were when written down by Newton, whether

interpreted as producing the future or as describing the world. You cannot see from the formulation of the law what the metaphysical underpinning is. At least, not without more information.

All scientific laws are compatible with the newspaper model, including Newton's laws that tell us that the future state of the world can be calculated and deduced from the present state just as the present state was produced from the past. How can the newspaper model support a formulation of a law that looks like the layer-cake model? This is justified by the idea that Newton's laws are the most efficient description of the world (within the domain of Newtonian physics), balancing simplicity and informativeness. It might be possible to describe the motion of the planets in a different way. For example, you may create a long list with the exact times and the exact spatial coordinates of the planets; such a list would be very informative (more informative than Newton's laws are), but it would be too complicated. The best balance between simplicity and informativeness to describe the motion of the planets is exactly how Newton formulated his laws.

Not all scientific laws are, in fact, compatible with the layer-cake model, which requires that the past state produced the present state and the present state produces the future. In order for this to make sense, Maudlin adds a third feature: the stipulation of a primitive flow of time independent from the laws. Common sense would agree. The past determines the present, and the present determines the future.

The Flow of Time

But in physics and philosophy, a primitive [flow of time](#) is highly controversial. Some physical laws do not match this structure. The laws of retro-causal models of quantum mechanics (in which the future determines the past), for example, are clearly incompatible with the layer-cake model and with the idea of a primitive flow of time. The laws of special relativity do not fit the layer-cake model either, [because](#) they defy an absolute notion of simultaneity, which is part and parcel of Newtonian mechanics.

The Straitjacket Model

As a reaction to this narrow scope of the layer-cake model, the philosopher Eddy Keming Chen and the mathematician Sheldon Goldstein, at the University of California, San Diego and Rutgers University respectively, as well as the philosopher Emily Adlam, at Chapman University, [have suggested](#) an alternative. Laws may be primitive, but they nonetheless 'merely' constrain the physical possibilities in the world. Call this the straitjacket model of laws of nature. No notion of production and no flow of time is required. All that laws do is to constrain what can happen in the world. In this way, we combine the advantages of the newspaper model with the advantages of the layer-cake model, because we acquire the generality of the newspaper model and a reason for stable regular behaviour from the layer-cake model. Now we have a metaphysical underpinning for retro causal laws and the laws of special relativity because laws, in the straitjacket model, are primitive and govern the world by constraining what can happen.

Still, the straitjacket model suffers from the same metaphysical issue that plagued the layer-cake model. The layer-cake model was not able to account for how laws produce new states. In a similar vein, the straitjacket model does not specify how laws can constrain what happens in the world. It seems again that abstract laws have to latch on to the real world to tell physical objects how to behave. How laws are able to do so remains unanswered.

Metaphysical Glue?

The possible implications for any form of law of nature are profound. The layer-cake model seems to be intuitively plausible – the present is determined by the past – but we found out that it requires that laws somehow affect the objects in space and time without being themselves located in space and time.

Since the layer-cake model is too restrictive to capture other formulations of physical laws, like retro-causality and general relativity, the straitjacket model was developed. This model does provide a framework for retro-causality and general relativity, yet it suffers from the same

metaphysical problem as the layer-cake model. The newspaper model, on the other hand, tries to introduce laws without any metaphysical baggage, and this seems to be a promising approach. Yet we seem to need a metaphysical glue to secure the stable behaviour of our world.

Best Model?

Given all this, which theory of laws best explains the regularities in our world? If the newspaper model were true, it would be a constant coincidence that the Sun rises every day or that the water in your kettle boils at 100°C, as there is no metaphysical constraint on how objects can behave. In contrast to many of my colleagues, I therefore find the newspaper model pretty unconvincing for explaining stable regularities. The layer-cake model and the straitjacket model fare better in this respect. The advantage of the straitjacket model is that it is general enough to capture unfamiliar laws of nature, like those describing retro-causality. But this virtue comes with a vice: the straitjacket model is so general that any law of nature would fit in.

The metaphysically interesting aspect of nature's laws is not that they constrain physical possibilities, but how they do that. Even if it is up for debate, the layer-cake model broadly addresses that question best. This works wonderfully with billiard balls. There are conditions where the model just can't explain how laws of nature produce the future, like retro-causality; but instead of seeking a single new overarching model, perhaps we'd be better off sticking with the layer-cake, after all, and developing a separate tailored account for each type of situation where that model does not fit.

* This essay first appeared in:

[Aeon Magazine 15 November 2024](#)

It is reproduced with permission of [Aeon](#).

Invitation to Submit Opinion Piece

In order to make better educational use of the wide geographical and disciplinary reach of this *HPS&ST Note*, 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 editor. 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 Note.

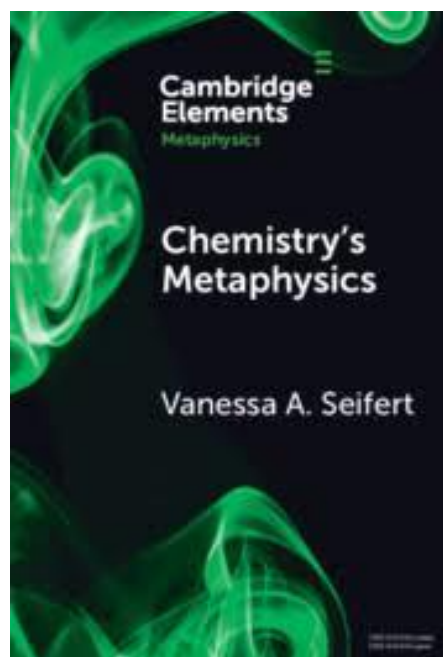
They will be archived, and downloadable, in the OPINION folder at the HPS&ST web site [HERE](#).

Varia

- Vale George E. Smith (1938-2024). Historian, philosopher, engineer and Newton scholar. [HERE](#)
- Eight HPS&ST books downloadable gratis [HERE](#)
- *Science & Education* Open Access articles (170) [HERE](#)

Featured Book:

Chemistry's Metaphysics, Vanessa A. Seifert, University of Athens, Greece



The place of chemistry in the metaphysics of science may be viewed as peripheral compared to physics and biology. However, a metaphysics of science that disregards chemistry would be incomplete and ill-informed. This Element establishes this claim by showing how key

metaphysical issues are informed by drawing on chemistry.

Five metaphysical topics are investigated: natural kinds, scientific realism, reduction, laws and causation. These topics are spelled out from the perspective of ten chemical case studies, each of which illuminates the novel ways that metaphysics of science can be informed by chemistry.

Download [HERE](#)

AUTHORS OR PUBLISHERS of suitable HPS&ST books who would like an appropriate Preface, Introduction or First Chapter of their book featured in the newsletter, and placed in the [RESOURCE](#) folder of the HPSST website, should contact newsletter editor [Michael R. Matthews](#)

Golden Oldie: HPS&ST Research from 30+ Years Ago

Good HPS&ST research is clearly written, philosophically informed, well-argued, and has enduring value. Clarity encourages critique and evaluation, where flaws can be identified and corrected. This is a condition for the advance of knowledge.

Much education research is timely. This is useful. But an unfortunate consequence can be that what is timely today might be irrelevant tomorrow. Circumstances change. The research might leave no trace. Conversely, some research can leave a big trace but be philosophically flawed and so do educational and, ultimately, cultural damage.

Good HPS&ST research has a long shelf-life. In defence of this claim, the [HPS&ST Newsletter](#) will identify 30+ years-old articles that had, and still have, philosophical, historical and educational value. They are Golden Oldies.

Fourth in the series:

De Berg, K.C.: 1992, 'Mathematics in Science: The Role of the History of Science in Communicating the Significance of Mathematical Formalism in Science', *Science & Education* 1, 77-87.

The use of a historical profile for illustrating the significance of the mathematical components of a scientific law is discussed in this paper. Such an approach addresses the need for the purposive use of scientific laws rather than the blind substitutionary procedures characteristic of most problem-solvers. The approach has the potential for increasing female participation in the physical sciences because of its reliance on learning modes favourable to female participation.

Downloadable [HERE](#)

Recent HPS&ST Research Articles

Chan, J., Erduran, S. (2024). Future-Oriented Science Learning and its Effects on Students' Emotions, Futures Literacy and Agency in the Anthropocene. *Res Sci Educ*, 1-21. <https://doi.org/10.1007/s11165-024-10213-1>

Coates, M. (2024). Does it Harm Science to Suppress Dissenting Evidence? *Philosophy of Science*, 1–18. <https://doi.org/10.1017/psa.2024.21>

Csiszar, A. (2024). Blurry Authorship: Originality in Science before and after Large Language Models. *Historical Studies in the Natural Sciences*, 611–616 <https://doi.org/10.1525/hsns.2024.54.5.611>

Galili, I. (2024). The Concept of Weight as Reflecting the Epistemological Changes in Physics. *Sci & Educ*, 1-30. <https://doi.org/10.1007/s11191-024-00588-y>

Hoffmann, C. (2024). When Scientists Disagree: Carl von Heß, Karl von Frisch, and the Study of Controversies. *Historical Studies in the Natural Sciences*, 535–568. <https://doi.org/10.1525/hsns.2024.54.5.535>

Kampourakis, K. (2024). Teaching School Genetics in the 2020s: Why “Naive” Mendelian Genetics Has to Go. *Cold Spring Harb Perspect Biol*, 1-12. doi: 10.1101/cshperspect.a041679

Kim, JU., Kang, D. & Kim, CJ. (2024). Analysing the Quality of Risk-Focused Socio-Scientific Arguments on Nuclear Power Using a Risk-Benefit Oriented Model. *Res Sci Educ*, 1-24. <https://doi.org/10.1007/s11165-024-10219-9>

Liu, H., Chen, B., Ma, J. et al. (2024). An Investigation of High School Students'

- Attitudes and Perceptions About the Diversity of Scientific Methods in Chemistry Learning. *Sci & Educ*, 1-21. <https://doi.org/10.1007/s11191-024-00589-x>
- Paillusson, F., Booth, M. (2024). Embracing Representational Plurality to Bypass Misconceptions in Science Education. *Sci & Educ*, 1-15. <https://doi.org/10.1007/s11191-024-00590-4>
- Pérez, G. (2024). Essentialism in Biology: Contributions to Teaching. *Sci & Educ*, 1-21. <https://doi.org/10.1007/s11191-024-00584-2>
- Peşman, H., Arı, Ü., Cirit, D.K. et al. (2024). Effect of Amount of Guidance in Inquiry-Based Physics Laboratory on Conceptual Understanding and Metacognitive Awareness. *Sci & Educ*, 1-21. <https://doi.org/10.1007/s11191-024-00595-z>
- Putri, P.A.W., Rahayu, S., Widarti, H.R. et al. (2024). Technology-Embedded Argument-Driven Inquiry in Preservice Chemistry Teacher Education. *Sci & Educ*, 1-37. <https://doi.org/10.1007/s11191-024-00581-5>
- Saribas, D., Çetinkaya, E. (2024). Exploring Pre-service Teachers' Reasoning Levels on Pseudoscientific and Scientific Texts. *Sci & Educ*, 1-25. <https://doi.org/10.1007/s11191-024-00583-3>
- Semilarski, H., Semilarski, H. (2024). Exploring Science Teacher's Perspectives on the Disciplinary Core Idea Map of Genetic Variation. *Sci & Educ*, 1-19. <https://doi.org/10.1007/s11191-024-00560-w>
- Thapaliya, P., Luitel, B.C. (2024). Nepali Cultural Worldview as Eclectic Space in Transformative Action Research for Post-Critical Scientific Literacy. *Sci & Educ*, 1-22. <https://doi.org/10.1007/s11191-024-00597-x>
- Viciana, H., Astobiza, A.M., Fasce, A. et al. (2024). Scientifically Together, Politically Apart? Epistemological Literacy Predicts Updating on Contested Science Issues. *Sci & Educ*, 1-24. <https://doi.org/10.1007/s11191-024-00587-z>
- Vílchez, J.E., Vílchez-González, J.M., Campillos, R. et al. (2024). Pre-service Teachers' Progression in Incorporating Science in Social Context in the Classroom. *Sci & Educ*, 1-19. <https://doi.org/10.1007/s11191-024-00578-0>
- Xiao, Y., Xie, C., Gong, Y. et al. (2024). Development and Validation of an Instrument to Assess Pre-service Physics Teachers' Views on Non-Epistemic Nature of Science. *Sci & Educ*, 1-40. <https://doi.org/10.1007/s11191-024-00593-1>

Recent HPS&ST Related Books

Allen, P. & Marcacci, F. (Eds.) (2024). *Divined Explanations. The Theological and Philosophical Context for the Development of the Sciences (1600-2000)*. Leiden: Brill

“Critical junctures in the historical development of science owe their origins to ideas, concepts, and theories that became definitive in the minds of leading scientists who lived in a more or less religious culture. Scientists are never solitary, but always internal to a network of scientific relationships and friendships. They have a well-attested genius, nurtured not only by their scientific training but also by ideas and stimuli received from the cultural and social contexts in which they lived. In particular, metaphysical and theological aspirations guided the genesis of many scientific ideas.

“This book offers twelve examples of the development of scientific ideas that were shaped by religious factors and which changed the course of science itself. The interwoven nature of science, philosophy, theology, and culture is pervasive in these cases, thus demonstrating that throughout the modern era, natural philosophy enjoyed a deep coherence with theology. That entanglement lingers in the minds of scientists into the contemporary period, and it continues to nourish scientific creativity in subtle and profound ways. New explanations of the world have emerged through illuminative, revolutionary and, one might say, divined ways.” (From the Publishers)

More information [HERE](#)

Doolittle, W. Ford (2024). *Darwinizing Gaia: Natural Selection and Multispecies Community Evolution*. Cambridge, MA: The Mit Press. ISBN: 9780262549523

“First conceived in the 1970s, James Lovelock's Gaia Hypothesis proposed that living organisms developed in tandem with their inorganic surroundings, forming a complex, self-regulating system. Today, most evolutionary biologists consider the theory problematic. In *Darwinizing Gaia*, W. Ford Doolittle, one of evolutionary and molecular biology's most prestigious thinkers, reformulates what evolution by natural selection is while legitimizing the controversial Gaia Hypothesis. As the first book attempting to reconcile Gaia with Darwinian thinking, and the first on persistence-based evolution, Doolittle's clear, innovative position broadens evolutionary theory by offering potential remedies for Gaia's theoretical challenges.

“Unquestionably, the current “polycrisis” is the most complex that Homo sapiens has ever faced, and this book can help overcome the widespread belief that evolutionary biologists don't believe Lovelock. Written in the tradition of Richard Dawkins's *The Selfish Gene*, *Darwinizing Gaia* will appeal to students, evolutionary scientists, philosophers, and microbiologists, as well as environmentalists seeking to understand the Earth as a system, at a time when climate change has drawn our planet's structure and function into sharp relief.” (From the Publishers)

More information [HERE](#)

Jordanova, Ludmilla (2024). *Defining Features: Scientific and Medical Portraits, 1660-2000*. Chicago, IL: The University of Chicago Press. ISBN: 9781780231532

“Portraiture as a genre is receiving increased attention at the same time that public curiosity about science is reaching unprecedented levels. Published to coincide with a major exhibition at the National Portrait Gallery, London, from 14 April – 17 September 2000, and the Sainsbury Centre for Visual Arts, University of East Anglia, from 27 September – 10 December 2000, *Defining Features* brings portraiture and science together.

“Ludmilla Jordanova's lucid text reflects on the nature of the relationship between art, science, medicine and technology by focusing on a selection of portraits that spans more than three centuries. Illustrated with likenesses of such notable personalities as Edward Jenner, Marie Curie, Charles Darwin, Albert Einstein and Dorothy Hodgkin, and encompassing a variety of media from paintings and medals to bookmarks and key rings, *Defining Features* charts changing attitudes towards medical practice and scientific investigation, as well as exploring how notions of gender, heroism, popularization and celebrity have affected the public's understanding of how researchers do their work.” (From the Publishers)

More information [HERE](#)

Krauss, Alexander (2024). *Science of Science: Understanding the Foundations and Limits of Science from an Interdisciplinary Perspective*. Oxford, UK: Oxford University Press. ISBN: 9780198937371

“How do we drive new knowledge and science? What are their present boundaries? And how can we improve science? We still do not understand these essential questions about science well, even though science is at the foundation of modern society.

“The emerging field of the science of science can provide answers. The central challenge of the field is accounting for and integrating the different empirical and theoretical knowledge across disciplines into a holistic field and uncovering the general mechanism driving science.

“*Science of Science* is the first book to provide an integrated framework for the field and thus aims to provide a comprehensive understanding of the foundations and limits of science. The book integrates 14 scientific fields and illustrates how our evolved mind (that enables us to observe, experiment and solve problems) makes doing science possible but also shapes what and how we observe. Our scientific methods and instruments (such as statistics and electron microscopes) enable us to study a much larger range of phenomena but

also puts constraints on how we measure them. Institutions and funding shape what knowledge we produce and how we evaluate our evidence, among other influences.

“Here, taking an interdisciplinary approach, Krauss explains how the sophisticated scientific tools we develop are the main driving force of creating new knowledge and advancing science. This methodological toolbox sets the scope and limits of what we can know and what is possible in science - while economic, social, and historical influences help shape what we study within that scope and those limits.

“The book provides a unifying theory for the field of science of science - the new-methods-drive-science theory. By better understanding the foundations of science we will also show how we can reduce the constraints and biases that we and our scientific methods and instruments face to advance science and push its present boundaries.” (From the Publishers)

More information [HERE](#)

Leys, Ruth (2024). *Anatomy of a Train Wreck: The Rise and Fall of Priming Research*. Chicago, IL: The University of Chicago Press. ISBN: 9780226836959

“In 2012, a team of Belgian scientists reported that they had been unable to replicate a canonical experiment in the field of psychology known as “priming.” The original experiment, performed by John Bargh in the nineties, had purported to show that words connoting old age unconsciously influenced—or primed—research subjects, causing them to walk more slowly. When subsequent researchers could not replicate these results, Nobel-winning psychologist Daniel Kahneman warned of a “train wreck looming” if Bargh and his colleagues could not address doubts about their work. Since then, the inability to replicate other well-known priming experiments has helped precipitate an ongoing debate over what has gone wrong in psychology, raising fundamental questions about the soundness of research practices in the field.

“*Anatomy of a Train Wreck* offers the first detailed history of priming research from its origins in the early 1980s to its recent collapse. Ruth Leys places priming experiments in the context of contemporaneous debates over not only the nature of automaticity but also the very foundations of social psychology. While these latest discussions about priming have largely focused on methodology—including sloppy experimental practices, inadequate statistical methods, and publication bias—Leys offers a genealogy of the theoretical expectations and scientific paradigms that have guided and motivated priming research itself.

“Examining scientists’ intellectual strategies, their responses to criticism, and their assumptions about the nature of subjectivity, *Anatomy of a Train Wreck* raises crucial questions about the evidence surrounding unconscious influence and probes the larger stakes of the replication crisis: psychology’s status as a science.” (From the Publishers)

More information [HERE](#)

Nicoglou, Antonine (2024). *Plasticity in the Life Sciences*. Chicago, IL: The University of Chicago Press. ISBN: 9780226837161

“Plasticity has become an important topic in biology, with some even wondering if it has now acquired the theoretical importance in biology that the concept of the gene enjoyed at the beginning of the last century. In this historical and epistemological study, philosopher Antonine Nicoglou shows how the recurrence of the general idea of plasticity—throughout the history of the life sciences—indicates its essential role in the way we think about life processes. Although plasticity has become a key element in new evolutionary thinking, she argues, its role in contemporary biology is also not insignificant. Rather, as mobilized in contemporary biology, plasticity most often seeks to account for the specific nature of living systems.

“The book is divided into two parts. The first takes up the history of plasticity from Aristotle to contemporary biology; the second part offers an original way of distinguishing between

different phenomena described by “plasticity.” In the process, the author explores what has led some biologists to speak of plasticity as a way of overcoming genetic determinism.” (From the Publishers)

More information [HERE](#)

Ramsey, Jeffrey L. (2024). *Sustainability and the Philosophy of Science*. London, UK: Routledge. ISBN 9781032215044

“This book demonstrates how the philosophy of science can enhance our understanding of sustainability and the practices we use to enact it. Examining assumptions about concepts, theories, evidence, and the moral ideals of sustainability can better orient us as we pursue this urgent and important goal.

“The book applies perspectives and tools from the philosophy of science – construed broadly to include portions of science and technology studies, history of science, and philosophy more generally – to sustainability discourse. It argues that widely held assumptions regarding the meaning of concepts, methods of theorizing and inferential practice, evidential structure, and ethics limit our understanding and practice of sustainability. It offers philosophical alternatives that capture more fully the confusing, wicked nature of sustainability challenges. The alternatives draw attention to existing but often undervalued frameworks in sustainability discourse.

“This book is aimed towards academics, researchers, and post-graduates working in sustainability, as well as philosophers of science and environmental philosophers interested in the philosophical issues raised by the pursuit of sustainability.” (From the Publishers)

More information [HERE](#)

Robertson, K. & Wilson, A (Eds.) (2024). *Levels of Explanation*. Oxford, UK: Oxford University Press. ISBN: 9780192862945

“The different sciences furnish us with a wide variety of explanations: some work at

macroscopic scales, some work at microscopic scales, and some operate across different levels. How do these different explanatory levels relate to one another, and what is an explanatory level in the first place?

“Over the last 50 years, more and more philosophers—both reductionists and anti-reductionists—no longer subscribe to the idea that the best explanation resides at the fundamental physical level. New challenges arise from the success of scientific explanations employing multi-level models which mix levels of explanation, from distinctive differences between levels structures in biology, cognitive science, and social science, from the apparently radical reimagining of the explanatory role of spacetime in our current best theories of fundamental physics, and from the enduring mystery of how higher-level explanations are possible in the first place.

“These questions naturally connect to classic philosophical ways of thinking about the relationships between levels: reduction, emergence, and fundamentality. This volume presents a snapshot of cutting-edge research on explanatory levels, from their conceptual foundations to the details of how they are used in scientific practice.” (From the Publishers)

More information [HERE](#)

Sarkar, Sahotra (2024). *The Vienna Circle: The Story of Logical Empiricism*. London, UK: Routledge. ISBN 9781032627304

“In Vienna in the 1920s a group of brilliant philosophers, mathematicians, and scientists – led by figures such as Moritz Schlick, Otto Neurath, Rudolf Carnap, and Hans Hahn – gathered to discuss the foundations of science and mathematics. Known as the Vienna Circle, they proposed to practice philosophy in continuity with science; their movement became known as Logical Empiricism.

“In this highly engaging book, Sahotra Sarkar tells the story of one hundred years of Logical Empiricism, from its beginnings in 1924 to its legacy today. He explains how its ideas, influenced by revolutionary theories of space,

time, and causality of that time, led to a quest for a unified theory of science. He shows how their commitment to logic and objectivity provided a powerful political antidote to Nazi racism and obscurantism. He charts the decline of the movement after many members, who had fled to the United States during World War Two, were presumed to have communist sympathies and subjected to surveillance and harassment. He argues that the ideas of the movement continue to be relevant today.

“A superb evocation of one of the most important intellectual movements of the twentieth century, *The Vienna Circle: The Story of Logical Empiricism* will be of great value to anyone interested in philosophy, history, and the history of science. (From the Publishers)

More information [HERE](#)

Sörlin, S., & Paglia, E. (2024). *Stockholm and the Rise of Global Environmental Governance: The Human Environment*. Cambridge: Cambridge University Press.

“This unique history examines global environmental governance through the lens of Stockholm, which has played an outsized role in shaping its development. Fifty years before Greta Thunberg started her School Strike for Climate, Swedish diplomats initiated the seminal 1972 U.N. Conference on the Human Environment that propelled Stockholm to the forefront of international environmental affairs. Stockholm has since become a hub for scientific and political approaches to managing the environmental and climate crisis.

“Utilizing archival materials and oral histories, Sörlin and Paglia recount how, over seventy years, Stockholm-based actors helped construct the architecture of environmental governance through convening decisive meetings, developing scientific concepts and establishing influential institutions at the intersection of science and politics. Focusing on this specific yet crucial location, the authors provide a broad overview of global events and detailed account of Stockholm's extraordinary impact. This title

is also available as Open Access on Cambridge Core.” (From the Publishers)

More information [HERE](#)

Authors of HPS&ST-related papers and books are invited to bring them to attention of the Newsletter's assistant editor Paulo Maurício (paulo.asterix@gmail.com) for inclusion in these sections.

PhD Awarded in HPS&ST

We welcome publishing details of all PhDs awarded in the field of HPS&ST. Send details (name, title, abstract, supervisor, web link) to editor: m.matthews@unsw.edu.au

Coming HPS&ST Related Conferences

March 6-10, 2025, US Philosophy of Education Society, PES, annual conference, Baltimore. Details: [HERE](#)

March 23-26, 2025, NARST Annual Conference, National Harbour, Maryland, USA. Details: [HERE](#)

March 27-29, 2025, Integrated History and Philosophy of Science, 10th conference. CIT Pasadena, CA. Details: [HERE](#)

March 27-28, 2025, Workshop on Scientific Pluralism, Epistemic Diversity, and Progress in Science. University of Wuppertal. Submissions by 15 November. Details: [HERE](#)

June 29-July 5, 2025 International Congress of Science and Technology, Dunedin, New Zealand. Details: [HERE](#)

July 1-5, 2025, Australian Science Education Research Association (ASERA) annual conference, Deakin University, Melbourne. Details: [HERE](#)

July 20-25, 2025 ISHPSSB Conference, University of Porto. Details: [HERE](#)

August 25-29, 2025, European Science Education Research Association, biennial conference, Copenhagen. Details: [HERE](#)

22-25 June 2026, 8th ICASE World Conference on
Science & Technology Education, University
College, Cork, Ireland
Details: [HERE](#)

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

[FHPP APS](#) - Forum on History and Philosophy of Physics of the American Physical Society

[HAD AAS](#) - Historical Astronomy Division of the American Astronomical Society.

[ACS HIST](#) – American Chemical Society Division of the History of Chemistry

[GWMT](#) - Gesellschaft für Geschichte der Wissenschaften, der Medizin und der Technik

[ISHEASTME](#) – International Society for the History of East Asian History of Science Technology and Medicine

[EASE](#) - East-Asian Association for Science Education

[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

[BAHPS](#) - Baltic Association for the History and Philosophy of Science

[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 at: [HERE](#)

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

HPS&ST NEWSLETTER PERSONNEL

Editor

Assistant Editor (Publications & Website

Assistant Editor

Michael Matthews

Paulo Maurício

Sophia Jeong