

# Philosophy of Physics and Metaphysics

Christian Wüthrich & Marta Pedroni

Fall 2024

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Class schedule: Thursdays 10-12, Uni Dufour U365  
Website: [https://wuthrich.net/teaching/\\_MA7\\_PhilPhysMPh\\_2024.html](https://wuthrich.net/teaching/_MA7_PhilPhysMPh_2024.html)  
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Philosophy of physics and metaphysics are intimately interconnected. In this seminar, students will confront issues at the intersection between these two areas. Different debates and methodologies in metaphysics of physics will be introduced and discussed. What are the metaphysical implications of our best physical theories? How can the tools of metaphysics inform the philosophy of physics? How do metaphysical debates evolve and develop in light of physics?

This seminar deals with topics at the intersection between philosophy of physics and metaphysics, such as laws of nature, (in)determinism, identity and individuality of the entities of our best physical theories, the part-whole relation, fundamentality, and emergence.

*Accessibility and Prerequisites.* No previous knowledge in physics or philosophy is presupposed, although familiarity with issues in metaphysics of science will be helpful. An overview of the relevant metaphysical debates will be presented at the beginning of the course. Notions of relativity, quantum mechanics, and thermodynamics will be introduced in dedicated lectures.

This course will be conducted entirely in English. It will include both introductory lectures and student presentations.

## Recommended texts

- Readings are available at Moodle at <https://moodle.unige.ch/course/view.php?id=17686>.

## Course requirements and evaluation

If this seminar is taken for credit, please let us know. You will have to fulfil requirements, depending on the module for which you are taking this course. For credit in philosophy:

- MA7:
  - travail écrit de recherche (env. 12 pages, 24'000 signes) et présentation orale durant le séminaire
- MA8:
  - travail écrit de recherche (env. 12 pages, 24'000 signes) ou présentation orale durant le séminaire

Contact us if you need credit in physics or in another programme.

Our expectation is that everyone prepares the assigned readings ahead of time, actively participates in the seminar (including those featuring a guest speaker), and accepts a reasonable share of presentation duties.

# Tentative schedule

**Readings:** for each session, the listed readings must be read in advance; the readings with an asterisk are optional readings.

<b>Date</b>	<b>Topic and reading assignments</b>
	<b>Part I – Time: Relativity and Thermodynamics</b>
19 Sept	Organisation, introduction <i>General explanation of the course structure, credits requirements, etc.</i> Lecture Craig Callender (2021), <i>Thermodynamic asymmetry in time</i> , Stanford Encyclopedia
26 Sept	Lecture John D. Norton (1999), <i>Philosophy of space and time</i> , sections 5.4 - 5.9
3 Oct	Persistence Yuri Balashov (1999), <i>Relativistic objects</i>
10 Oct	The nature of spacetime Trevor Teitel (2022), <i>How to be a spacetime substantialist</i>
17 Oct	The Past Hypothesis Craig Callender (2004), <i>There is no puzzle about the low-entropy past</i> *Huw Price (2004), <i>On the origins of the arrow of time: why there is still a puzzle about the low entropy past</i>
24 Oct	Laws of nature Barry Loewer (2012), <i>Two accounts of laws and time</i>
	<b>Part II – Matter: Quantum Mechanics</b>
31 Oct	Lecture David Albert (1992), <i>Quantum mechanics and experience</i> , Ch. 1 and 2 *Jenann Ismael (2020), <i>Quantum mechanics</i> , Stanford Encyclopedia *Alyssa Ney (2013), <i>Introduction</i> (in <i>The wave function: essays on the metaphysics of Quantum mechanics</i> )
7 Nov	No seminar (semaine de lecture)
14 Nov	No seminar
21 Nov	Identity and individuality Simon Saunders (2006), <i>Are quantum particles objects?</i>
28 Nov	Indeterminacy Claudio Calosi & Jessica Wilson (2019), <i>Quantum metaphysical indeterminacy</i>
5 Dec	Mereology Jenann Ismael & Jonathan Schaffer (2020), <i>Quantum holism: nonseparability as common ground</i>
12 Dec	Guest lecture Workshop organised by the <i>Space, Time and Causation in Quantum Gravity</i> project
19 Dec	Laws of nature Mauro Dorato & Michael Esfeld (2016), <i>The metaphysics of laws: Dispositionalism vs Primitivism</i>