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Département de philosophie  
Université de Genève

## Philosophy of Physics: Metaphysics of Quantum Gravity

SE, A, Je 16-18, SO 019

Modules: MA6/8

19.09. Introduction to the seminar and the topic (BLB, AV and CW)  
Background reading: Baptiste Le Bihan and Annica Vieser (forthcoming).  
Metaphysics of Quantum Gravity. *Internet Encyclopedia of Philosophy*.

### *Part 1: Disappearance of spacetime in quantum gravity*

26.09. Approaches to Quantum Gravity. The following readings will be distributed among the participants:

- Nick Huggett and Christian Wüthrich (forthcoming). § 3: Spacetime from causality: causal set theory. In: *Out of Nowhere: The Emergence of Spacetime in Quantum Theories of Gravity*. OUP.
- Baptiste le Bihan (forthcoming). String Theory for Metaphysicians. In: *The Ruins of Spacetime: An Introduction to the Metaphysics of Quantum Gravity*.
- Carlo Rovelli (2008). Loop quantum gravity. Talk at *String 08*, accessible via [Loop quantum gravity - CERN Document Server](#).
- Nick Huggett and Christian Wüthrich (forthcoming). § 6.1: The non-spatiotemporality of canonical LQG. In: *Out of Nowhere: The Emergence of Spacetime in Quantum Theories of Gravity*. OUP.

03.10. Richard Healey (2002). Can physics coherently deny the reality of time? *Royal Institute of Philosophy Supplements*, 50:293-316.

### *Part 2: Emergence and fundamentality*

10.10. Elizabeth Barnes (2012). Emergence and Fundamentality. *Mind* 121 (484):873-901.

### *Part 3: Spacetime emergence*

17.10. Karen Crowther (2022). Spacetime Emergence: Collapsing the Distinction Between Content and Context? In: Shyam Wuppuluri and Ian Stewart (eds.), *From Electrons to Elephants and Elections: Saga of Content and Context*, Springer.

24.10. Vincent Lam and Christian Wüthrich (2018). Spacetime is as spacetime does. *Studies in History and Philosophy of Modern Physics*, 64:39-51.

31.10. Baptiste Le Bihan (2021). Spacetime Emergence in Quantum Gravity: Functionalism and the Hard Problem. *Synthese* 199 (2):371-393.

07.11. No session (semaine de lecture)

- 14.11. Sam Baron and Baptiste Le Bihan (2022). Composing spacetime. *Journal of Philosophy*, 119(1):33-54.
- 21.11. Kristie Miller (2024). Spatiotemporal projectivism. In: Stephen Hetherington (ed.), *Extreme Philosophy*, 47-61. Routledge.

*Part 4: Consequences for metaphysics*

- 28.11. Vincent Lam and Christian Wüthrich (2023). Laws beyond spacetime. *Synthese*, 202(71).
- 05.12. Sam Baron and Kristie Miller (2014). Causation in a timeless world. *Synthese*, 191:2867-2886.
- 12.12. **Seminar: laws of nature and quantum gravity**
- 19.12. Christian Wüthrich (2021). Time Travelling in Emergent Spacetime. In: Judit Madarász & Gergely Székely (eds.), *Hajnal Andréka and István Németi on Unity of Science: From Computing to Relativity Theory Through Algebraic Logic*. Springer, 453-474.

## Course description

This seminar focuses on a young research field within metaphysics and philosophy of physics: the metaphysics of quantum gravity. Quantum gravity is an umbrella term for research programs aiming at the formulation of a physical theory that reconciles the theory of general relativity with quantum physics. A striking feature of most of those theories is that various features usually ascribed to space and/or time seems to disappear, prompting questions about how to relate such exotic ontologies to the familiar world of our daily lives, happening in space and time. The seminar will first introduce three important approaches to quantum gravity emphasizing the features of spacetime missing in each approach: string theory, loop quantum gravity, and causal set theory. Then, a number of problems of conceptual and empirical coherence for claims of spacetime emergence will be investigated and linked to a variety of interpretations of the non-fundamentality of spacetime. The last part of the seminar will focus on some consequences of the non-fundamentality of spacetime for other areas of metaphysics, such as the philosophy of time, modality, and laws of nature.

The seminar will be in English.

## Course requirements

For credit in philosophy (contact us if you need credit in another program):

- MA6 : travail écrit de recherche avec soutenance (env. 25 pages, 50'000 signes)
- MA8 : travail écrit de recherche (env. 12 pages, 24'000 signes) ou présentation orale durant le séminaire

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.

## Seminar presentations

We expect everyone to do a brief presentation on one of the assigned readings. When it is your turn, please keep the following points in mind:

- While you will be the leader for the entire seminar on this day, including the discussion, the initial presentation should last (if given in one piece) about 15 to 20 minutes.
- Therefore, it is important to stick to the main points, the author's *main thesis* and their *main argument*, rather than to give a complete or chronological list of points raised in the article.
- We encourage you to use some *visual complement* (blackboard, powerpoint slides, handout), and to see this seminar as an opportunity to experiment with a format you have not yet tried.
- Make sure to read the article sufficiently ahead of time, so that we have time to make an appointment if you want to meet and discuss it before your presentation.
- Don't stress out if there is something in the article you don't understand after having made an effort to grasp it. In this case, try to articulate precisely what it is that you don't understand—and it may well become the topic of our seminar discussion.