Acknowledgments

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- Kei Hotoda, John Dougherty, Joshua Norton, Tracy Sikorski
- Program committee: Jeremy Butterfield, Craig Callender, Elena Castellani, Kevin Davey, Richard Dawid, Doreen Fraser, Eleanor Knox, Vincent Lam, Lewis Licht, Dean Rickles, David Rideout

Why 'Philosophical' Foundations?

Nick Huggett and Christian Wüthrich

Seminar on the Philosophical Foundations of Quantum Gravity
University of Illinois, Chicago

27 September 2013

1. Nick's part
   - History
   - Philosophical Lessons: Physics Involves Philosophy
2. Chris's part
   - On to quantum gravity
   - The seminar

The Question of 'True Motion'

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- Newton: *Absolute motion [true rather than apparent] is the translation of a body from one absolute place into another*. (Scholium on Space and Time)
- Leibniz: *. . . there is a difference between [a] true motion of a body, and a mere change of place relative to another body. For when the immediate cause of the change is in the body, that body is truly in motion*. (Corr. with Clarke V.53)

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Their 'philosophical' accounts of motion are intimately connected to their physical theories of motion.

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2. New theories are not born fully-formed, but developed in conflicting fragments from different clues and insights.
   - Hence while a theory is developed, the theoretical concepts are themselves conflicting and fragmentary.
3. Historically, and perhaps necessarily, part of the work of unifying theory fragments into a theoretical whole has involved carefully thinking through the concept fragments, to see how they can be rendered into a coherent whole.
   - Friedman: That is why philosophy of physics is possible – and indeed inevitable!

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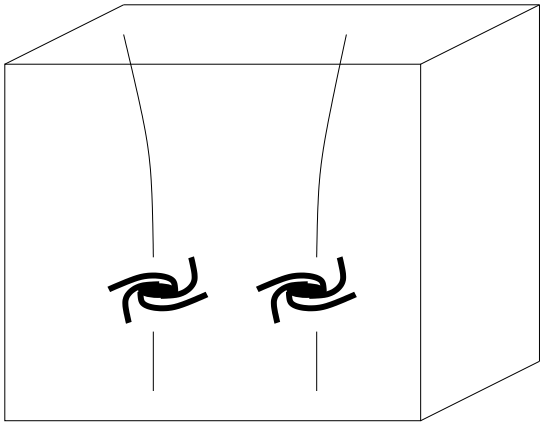
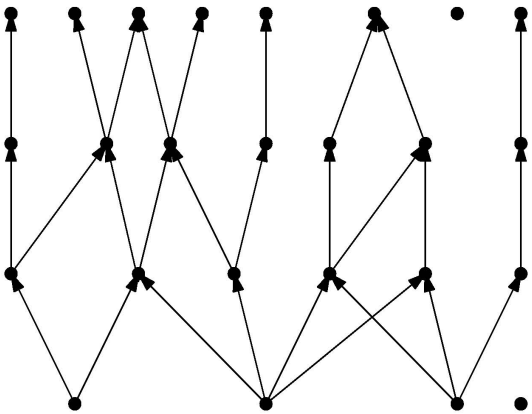
Huggett, Nick and Wüthrich, Christian. Emergent spacetime and empirical (in)coherence. *Studies in the History and Philosophy of Modern Physics* **44** (2013): 276-285.

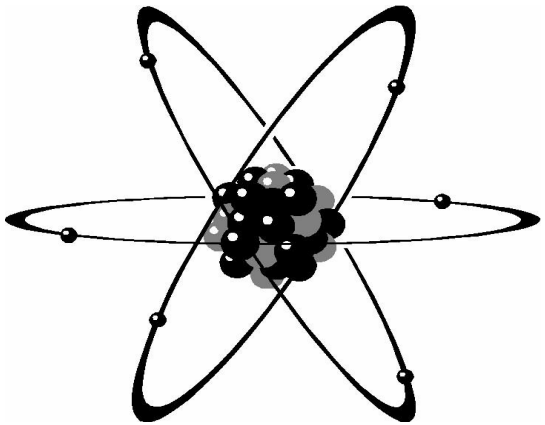
The non-fundamentality of spacetime



emergent



fundamental



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Two main reasons to think that:

1. The further one goes from experience, and from experiment, the more one relies on theory to give meaning – even extended versions of ostension break down.
2. Spacetime is assumed by so many extant physical concepts, that the gulf is likely to be large – very deep principles need to be rethought.

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- In such an anomalous state of the science, and assuming that the picture of the necessity of philosophy sketched above is correct, there is plenty of work to be done conceptually, as part of the more formal developments.
- Of course, there is no principled demarcation of this conceptual work from the formal – it is a joint task for physicists and philosophers.