Philosophy 9???: Philosophy of Space and Time

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· Office Hours: TBD

StH 1145, W 11:30 - 2:30

Evaluation: Participation, weekly short responses, presentation, and either (1) a research paper due at the end of the term, or (2) three shorter papers due roughly every 4 weeks. For option (1), a brief description of the paper topic and / or outline, along with a bibliography, is due Nov. 29, and I am happy to consult with students. For option (2), students will be responsible for choosing topics for 6-8 page papers based on the readings and seminar discussion. Students choosing either option will give a 30 minute presentation, on a topic of their choice (in consultation with me). Short responses: brief comments (about 300-500 words) on papers to be discussed in the seminar, due weekly at 5:00 p.m. on Tuesday before class (full credit for six responses).
I will aim to insure that the seminar is accessible to students who are not familiar with the relevant mathematics and physics, although I will presume basic undergraduate mathematics. If there is an interest in doing so, I would be willing to hold optional sessions devoted to more technically detailed discussions.

Course Website & Readings: Assigned readings, supplementary readings, updated schedules, and short responses will be posted on the website.

Tentative Topics

This is a tentative list of topics that will be revised in summer 2017. The first three items in the list below are core topics; choices from the rest of the list will depend on the interests of students enrolled in the course.

- Introduction: Space, Time and Motion in Classical Mechanics
  - Earman, *World Enough and Spacetime*, Chapters 2-3.
  - Belot, "Geometry and Motion," *BJPS* **51** (2000): 561-595.
  - Stein, "Newtonian Spacetime."
- Special Relativity and Minkowski Spacetime
  - Einstein, "On the Electrodynamics of Moving Bodies," (Kinematical Part), in *The Principle of Relativity*.
  - di Salle, *Understanding Space-Time*, Chapter 4 (4.1-4.3).
  - Brown, *Physical Relativity* (selections).
- General Relativity and Relativistic Spacetimes (3-4 weeks)
  - Einstein's path to general relativity: Einstein, "The Foundation of the General Theory of Relativity," in *The Principle of Relativity* (selections); selections from historical literature, e.g. Renn et al., *Einstein's Zurich Notebook*
  - di Salle, *Understanding Space-Time*, Chapter 4 (4.4-4.7).
  - Malament, "Classical General Relativity," in *Handbook for the Philosophy of Physics*, edited by Earman and Butterfield, and lecture notes (available at Malament's website).

  - Malament, *Topics in the Foundations of General Relativity and Newtonian Gravitation Theory* (selections).

- Hole Argument and Background Independence (2-3 weeks)
  - Earman and Norton, "What price spacetime substantivalism? The hole story," *BJPS* **38** (1987): 515-525.
  - Earman, *World Enough and Spacetime*, Chapter 9.
  - Butterfield, "The Hole Truth," *BJPS* **40** (1989): 1-28.
  - Hoefer, "The Metaphysics of Spacetime Substantivalism," *Journal of Philosophy* **93**: 5-27.
  - Earman, "Two Challenges to the Requirement of Substantive General Covariance," *Synthese* **148** (2006).
  - Pooley, "Substantivalist and Relationalist Approaches to Spacetime".
  - Belot, "Background Independence" (selections).

- Reconsidering Relationalism
  - Belot, *Geometric Possibility* (selections).
  - Belot, "Rehabilitating Relationalism," *International Studies in Philosophy of Science* **13**: 35-52.
  - Pooley and Brown, "Relationalism Rehabilitated I: Classical Mechanics" *BJPS* **53**: 183-204.
  - Huggett, "Regularity Account of Relational Spacetime" *Mind* **115**: 41-73.
  - Rynasiewicz, "Absolute Versus Relational Space-Time: An Outmoded Debate?," *Journal of Philosophy* **93** (1996): 279-306.
  - Hoefer, "Absolute Versus Relational Spacetime: For Better Or Worse, the Debate Goes on,"*BJPS* **49** (1998): 451-467.

- Cosmology, Time's Arrow, and the "Past Hypothesis"
  - Albert, D. (2000). *Time and Chance*. Cambridge, MA: Harvard University Press. (Selections.)
  - Earman, J. (2006). "The 'Past Hypothesis': Not even false." *SHPMP* **37**: 399-430.
  - North, J. (2011). "Time in thermodynamics," in *The Oxford Handbook of Philosophy of Time*: 312-350.
  - Torretti, R. (2007) "The problem of time's arrow historico-critically reexamined." *SHPMP* **38**: 732-756.
  - Wallace, D. (2010). "The Logic of the Past Hypothesis."
  - Winsberg, E. (2004). "Can conditioning on the 'past hypothesis' militate against the reversibility objections?" *Philosophy of Science*.

- Black Holes and Singularities
  - Earman, *Bangs, Crunches, Whimpers, and Shrieks* (selections).
  - Manchak, "Global Spacetime Structure."

- Other Possible Topics
  - Relativistic cosmology
  - Observation and prediction in general relativity