Physics 7661 Fall 2021
Final presentations

Who? If you registered for the course, but completed less than half the homework,[1] then you must do a final presentation to get a 'satisfactory' grade for the course. For everyone else, final presentations are optional.

What? Pick a topic related in some way to this course, read a paper or two or a book chapter on the topic, and present a summary to the class. The length of the presentation will be decided later when I know how many people are presenting, but for planning purposes you can suppose the presentation will be about 20 minutes.

When? Presentations will be Friday, Dec 3, at 10am and Friday, Dec 10 at 2pm (location TBD). Attendance is optional for anyone not presenting. If you cannot make either time, and you want to give a presentation, let me know soon.

Topics: Please select a topic from the list below, or pick your own, and then check with me so that we don't get duplicates. First person to claim a topic gets it. Please pick a topic by Friday, Nov 19.

Some topic ideas

1. Witten diagrams in AdS/CFT. See Witten's paper, hep-th/9802150.

2. Black hole evaporation in 2d gravity (the RST model). See arXiv:2004.13857 and Fiola, Preskill, Strominger, Trivedi "Black hole thermodynamics and information loss in two dimensions."

3. The Bekenstein entropy bound and the Bousso bound:
   see http://www.scholarpedia.org/article/Bekenstein_bound, Bousso hep-th/9905177, and Casini 0804.2182.

4. Entanglement growth and black hole interiors: see 0708.3750, 1303.1080, and 1311.1200.

5. Minimal model CFTs. These are exactly solveable CFTs in 2d important for critical phenomena, including the 2d critical Ising model. See chapters 7-8 (and maybe 12) of the CFT book by Di Francesco et al.

[1] If you're not sure, ask me.

6. Boundary CFT: see Chapter 11 of Di Francesco et al.'s CFT book.

7. The Zamolodchikov c-theorem (monotonicity of the RG in 2d); see Zamolodchikov 1986 and Friedan-Capelli-Latorre 1991.

8. The a-theorem (monotonicity of the RG in 4d); see the conjecture by Cardy in Phys Lett B215, p749, 1998, and the proof (decades later!) by Komargodski and Schwimmer 1107.3987, Komargodski 1112.4538.

9. Scale vs conformal invariance: see Polchinski 1988 (2d version) and/or the 4d version in 1204.5221.

10. The $1/N$ expansion in gauge theory; see the discussion in Kiritsis's String Theory book, and Witten's paper 'Baryons in the 1/N expansion'.

11. The bound on chaos. See Maldacena, Shenker and Stanford, arXiv:1503.01409.

12. JT Gravity. See Maldacena, Stanford, Yang 1606.01857

13. The SYK model. See Maldacena, Stanford, 1604.07818.

14. Hayden and Preskill on information recovery from black holes. See their paper "Black holes as mirrors: quantum information in random subsystems".

Or pick your own! Find a chapter in a book, a review paper, or an original paper to read. Check with me first.