Axions and Vacuum structure of Gauge theories

Primary sources:

TASI Lectures on the Strong CP Problem and Axions, Anson Hook:
https://arxiv.org/abs/1812.02669

The Strong CP problem and Axions, R.D Peccei:
https://arxiv.org/abs/hep-ph/0607268v1

David Tong: Lectures on Gauge Theory:
https://www.damtp.cam.ac.uk/user/tong/gaugetheory.html

Axion Cosmology, David J.E. Marsh: https://arxiv.org/abs/1510.07633

Topology of cosmic domains and strings, Kibble:
https://iopscience.iop.org/article/10.1088/0305-4470/9/8/029

Cosmic Strings, Hindmarsh and Kibble:
https://iopscience.iop.org/article/10.1088/0034-4885/58/5/001

Outline:

1. 10/15 The U(1)A Problem and Its Resolution, theta vacua of QCD.
2. 10/22 Strong CP problem and the axion solution. The theory of pions and neutrons.
3. 10/29 Invisible axion models. Axion couplings to the Standard Model particles. Axion mass.
4. 11/5 Topological defects. Kibble mechanism. The domain wall problem.
5. 11/12 Cosmic strings.
6. 11/19 Axion strings are superconducting.

   11/26 Thanksgiving

7. 12/3 The dynamics of axion strings. Strings in the early Universe.
8. 12/10 The axion quality problem. Quantum gravity breaks global symmetry.

Quantum Chaos

Primary sources:

From Quantum Chaos and Eigenstate Thermalization to Statistical Mechanics and Thermodynamics https://arxiv.org/pdf/1509.06411.pdf

Chaos and Quantum Thermalization https://arxiv.org/pdf/cond-mat/9403051.pdf

Black holes as mirrors: quantum information in random subsystems https://arxiv.org/pdf/0708.4025.pdf

Outline:

9. 10/15 Classical Chaos and Random Matrix Theory
10. 10/22 Berry's conjecture and the semi-classical limit
11. 10/29 Quantum chaos in physical systems
12. 11/5 Eigenstate Thermalization
13. 11/12 Numerical demonstrations in Lattice systems
14. 11/19 Black holes as mirrors pt1

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15. 12/3 Black holes as mirrors pt2
16. 12/10 Grab-bag