PiTP 2023
Pre-Reading List
(as of 7/21/23)

Sergei Dubovsky, NYU

The prereading material for my lectures will be:

1) https://arxiv.org/abs/1404.0037
2) https://arxiv.org/abs/1511.01908
3) https://arxiv.org/abs/1611.09796
4) https://arxiv.org/abs/1906.08098

Igor Klebanov, Princeton University

The suggested reading includes these reviews:

[hep-th/0108101] Remarks on the Warped Deformed Conifold (arxiv.org)
[0803.1315] Gauge-String Dualities and Some Applications (arxiv.org)

V. Parameswaran Nair, CCNY

The pre-reading materials include:

`Planar Yang-Mills Theory: Hamiltonian, Regulators and Mass Gap,'
D. Karabali, Chanju Kim and V.P. Nair, Nucl. Phys. B524, 661 (1998);
hep-th/9705087

`On the vacuum wavefunction and string tension of Yang-Mills theories
in (2+1) dimensions,' D. Karabali, Chanju Kim and V.P. Nair, Phys. Lett.
B434, 103 (1998); hep-th/9804132

`The Hamiltonian Approach to Yang-Mills (2+1): An Expansion Scheme and
Corrections to String Tension', D. Karabali, V.P. Nair and A. Yelnikov,
Nucl. Phys. B824, 387 (2010); arXiv:0906.0783

`The Hamiltonian Approach to Yang-Mills (2+1): An Update and Corrections
to String Tension', Review talk at the *Workshop on QCD Green's Functions,
Confinement and Phenomenology, QCD-TNT09*, September 7-11, 2009,

Trento, Italy; arXiv:0910.3252, published in the *Proceedings of Science*,
PoS (QCD-TNT09) 030,
http://pos.sissa.it//archive/conferences/087/030/QCD-TNT09_030.pdf

`Casimir Effect in (2+1)-dimensional Yang-Mills Theory as a Probe of the Magnetic Mass',
D. Karabali and V.P. Nair, Phys. Rev. D98, 105009 (2018); arXiv:1806.07979

Joao Penedones, EPFL Lausanne

I plan to teach S-matrix Bootstrap applications to flux tubes and QCD. Recommended pre-reading:

- Chapters 4, 5 and 6 of Tong's lecture notes here:
- http://www.damtp.cam.ac.uk/user/tong/gaugetheory.html
- https://inspirehep.net/literature/1221254
- https://inspirehep.net/literature/1092955

Other references:
- https://inspirehep.net/literature/1740471
- https://inspirehep.net/literature/1868477
- https://inspirehep.net/literature/1701028
- https://inspirehep.net/literature/1828526

Mikhail Shifman, University of Minnesota

Suggested reading at the following link:

https://www.amazon.com/Supersymmetric-Gauge-Field-Theory-String-ebook/dp/B00SC7ZO2W/ref=sr_1_2?crid=W5RZLZL8MO1Y&keywords=bailin+Love&qid=1689027442&s=books&sprefix=bailin+love%2Cstripbooks%2C120&sr=1-2

This is an open access book. Read from pages 1 to 82 to facilitate understanding.

Grigory Tarnopolskiy, Carnegie Mellon University

Reading list:

1. S. R. White, “Density matrix formulation for quantum renormalization groups,” Phys. Rev. Lett. 69, 2863 (1992).

2. J. I. Cirac and F. Verstraete, “Renormalization and tensor product states in spin chains and lattices,” Journal of Physics A: Mathematical and Theoretical 42, 504004 (2009).

3. U. Schollwo¨ck, “The density-matrix renormalization group in the age of matrix product states,” Annals of Physics 326, 96 (2011)

4. R. Oru´s, “A practical introduction to tensor networks: Matrix product states and projected entangled pair states,” Annals of Physics 349, 117 (2014).

Michael Teper, Oxford University

After an introduction to lattice field theory calculations, with some detailed explicit examples, my lecture will focus on what we have learned about confinement on the lattice. I intend to make my lectures reasonably self-contained, but it will provide some useful preparation to look at some of the following reviews.

1] M. Teper: 'Large N and confining flux tubes as strings - a view from the lattice', arXiv:0912.3339.
These Cracow School lectures overlap with the first part of my 3 lectures.

2] T. DeGrand: 'Lattice methods for students at a formal TASI', arXiv:1907.02988.
These readable TASI 2019 lectures cover more ground without being mired in detail.

3] C. Morningstar: 'The Monte Carlo method in quantum field theory', arXiv:hep-lat/0702020.
These lectures cover in some detail the Monte Carlo algorithms that I will not have the time to say much about.

4] A. Joseph: 'Markov Chain Monte Carlo Methods in Quantum Field Theories: A Modern Primer', arXiv:1912.10997.
A more recent review with a somewhat different perspective.

5] J. Greensite: 'Confinement from Center Vortices: A review of old and new results', arXiv:1610.06221.
A review of the evidence for the 'centre vortex' theory of confinement. (Objects charged under a 1-form symmetry.)

6] M. Chernodub and M. Polikarpov: 'Abelian Projections and Monopoles' arXiv:hep-th/9710205.
A review of the idea ('dual superconductivity') that it is the magnetic monopoles that appear after performing a projection of SU(N) to U(1) fields that drive confinement.

7] J. Greensite: 'An introduction to the confinement problem' (Springer, 2nd edition 2020).
This book provides a review of the main efforts to understand confinement using lattice techniques.

Mithat Unsal, North Carolina State University

Below is the reading list for my lectures:

1) Quark Confinement and Topology of Gauge Groups
Alexander M. Polyakov
Published in: Nucl.Phys.B 120 (1977) 429-458

2) Instantons and (Super) Symmetry Breaking in (2+1)-Dimensions
Ian Affleck, Jeffrey A. Harvey, Edward Witten
Published in: Nucl.Phys.B 206 (1982) 413-439

3) Center-stabilized Yang-Mills theory: Confinement and large N volume independence
Mithat Unsal, Laurence G. Yaffe
Published in: Phys.Rev.D 78 (2008) 065035

4) Magnetic bion condensation: A New mechanism of confinement and mass gap in four dimensions
Mithat Unsal
Published in: Phys.Rev.D 80 (2009) 06500