

mini-Projects

presentations

- summarize key physics points in reading.
- 20 min presentation
 - 5-10 slides: demonstrating an intro. for basic theory / method, and the key results
 - numerical demonstration: in the form of a problem set (of course you need to solve it!)
- numerical codes

topics

Choose one topic from below or form your own! Here are some suggestions (and guiding questions)

- Animating EM waves from time-varying charge distribution.
 - Compute the time-dependent E and B fields from a charge distribution. Draw the field lines.
 - Accelerates the charge distribution and show simulate how EM waves are formed.
 - Why sky is blue and the ω^4 dependence.
 - Dispersive medium, linear response and all that.
- Understanding resonances.
 - [resonances](#)
 - [kinematics](#)
 - how (intermediate) resonances show up in a Dalitz plot.
 - how dynamics are affecting the distributions.
 - coupled-channel models.
- Path Integral for dissipative system.
 - [Rosenfelder](#)
 - [Chow & Buice](#)
 - study the damped oscillator problem.
 - dissipative Quantum System.
 - extracting the density of states.
 - moment generating functionals.
- Simulation of non-abelian gauge theory.
 - study the SU(2) or SU(3) gauge groups (or beyond!)
 - write numerical code to extract observables.
 - study the Polyakov loop (and its susceptibility)
 - effective model description

- [ref1](#)
- Modeling of the QCD phase diagram.
 - NJL model VS the bag model.
 - Confinement of quarks VS Confinement of gluons.
 - Cluster / virial expansion: a symbolic computation.
 - 3rd and 4th virial coefficients in a potential model.
 - phase space models for dense matter.