

Physics 222. Quantum Field Theory 3. Professor Dine

Spring, 2009. Homework Set 5. Due Mon., June 8

This is a relatively easy one. This is a good chance to catch up on problems which aren't done, and your reading (which should match the chapters with the problem sets; see the syllabus.

1. Dine 11.2
2. Dine 11.3
3. At least skim chapter 17, and read chapter 18. Verify eqns. 18.15, 18.16. Estimate as best you can the age of the universes when the temperature is a) 1 eV b) 1 MeV c) 1 GeV
4. Suppose a stable, neutral particle can be produced in scattering of ordinary quarks and leptons with a cross section comparable to that of the weak interactions. Estimate, as best you can, the final density of these particles. If the particle mass is 10 GeV, compare the energy density in these particles with the dark matter density.
5. **Track 2** 14.1.
6. **Track 2** 14.2