Instead of having a final exam in this course, each of you will be required to write a paper on a subject in high energy physics. The topic may be chosen from the list given below, or you may choose one of your own. However, please do not choose a topic on which you are already doing research. If you wish to choose your own topic, please check with me before proceeding. Each paper should include references to the current literature. You should clearly explain the topic you are discussing and give enough details so that someone not familiar with the topic can, nevertheless, follow your presentation. Do not simply quote material from a selection of papers. Discuss the experimental results and present enough of the theory that the reader can see the significance of the equations you quote. I will be happy to answer questions that you may have on the material you find.

In order to research the literature, I suggest that you visit the archives at arXiv.org (see especially hep-ph and hep-ex) and at inspirehep.net. Some example references are given below - I’ll update these as the semester progresses.

These papers are to be done independently, although I encourage you to discuss your topics with others (faculty or students) in order to get broader viewpoints.

Possible topics:

1. $\sin^2 \theta_w$: Its value, how it has been measured, and the significance of the new results from NuTeV (see hep-ex/0110059 and references therein, hep-ph/0112302, hep-ph/0209200, hep-ex/0504049).

2. $\nu$ oscillations: give a brief overview of the key experimental results which indicate that neutrinos may have mass (discuss both the solar and atmospheric neutrino problems). See hep-ex/0106089, for example. Here is a more recent review: T. Kajita, Int.J.Mod.Phys.A24:3437-3446,2009.


8. The Higgs boson in the Standard Model - what is it and why is it important? Summarize the discovery of a “Higgs-like” boson at the LHC. See arXiv:1211.4828[hep-ph]

The papers are to be turned in to me no later than 5:00 PM on Monday, May 1, 2017.