

PHYX442-0 Winter 2008 : Collider Physics

Tech LG68

MW 3:00 PM - 4:20 PM

Office Hours (Tech F224):

W 1:00 PM - 2:30 PM

Professor Tim Tait

Tech F224

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Course Information on the Web:

<http://www.hep.anl.gov/tait/course/phyx442.html>

Grading will be computed as Homework counting 30%, and there will be three “special projects” each counting 20/20/30%. Homework will be assigned in class and will also be available on the website. It can be turned in in class and will be a mixture of traditional problems and some simple exercises that can be performed by connecting to the MadEvent website (see below) on the world wide web. “Special projects” are (slightly) longer assignments with some options so you can choose something of particular interest to you. (I will have a list of suggestions when the time comes, and you can also pursue something of your own devising, but consult with me in that case).

We will do simple calculations by hand to understand the concepts. More complicated simulations will be done using the MadEvent computer package (which can be used on the web if you register; I have their kind permission for us to use their server at UIUC to do complete simulations). If you have a unix environment, you can also install the code there, which is preferable if it works for you. Detailed instructions as to how to get started will be part of the homework assignments, but for reference, their web page is:

<http://madgraph.hep.uiuc.edu/>

Course Outline:

- Review of Special Relativity.
- Some Elements of Quantum Field Theory & Feynman Rules.
- Particle Decays & Phase Space.
- Cross Sections and Scattering Theory.
- e^+e^- Reactions.
- “Jets” of hadrons, “showering”, & “hadronization”.
- Scattering of hadrons and “partons”.

There is no formal text book, but some potentially useful references are:

- F. Halzen and A. D. Martin, “Quarks And Leptons: An Introductory Course In Modern Particle Physics,” *New York, Usa: Wiley (1984) 396p.*
- D. J. Griffiths, “Introduction to Elementary Particles,” *New York, USA: Wiley (1987) 392p*