

PHYX442-0 Winter 2008 : Collider Physics

Homework Assignment 2 : MadEvent Registration and Quantum Field Theory

1. Register for MadEvent

Go to the MadEvent Web site:

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

Click the “Register” link at the top left.

Put in your name, affiliation, and email address.

When you receive the email confirmation for your account, send an email containing your name, the user name you were assigned, and the email address you registered with to:

tait@northwestern.edu

I will have them give you “run user” access so you can generate your events on their cluster.

2. Quantum Antenna

Consider a free neutral scalar quantum field $\phi(x)$ with mass m . We turn on a source with some dependence in space and time which is characterized by the function $j(x)$. (How exactly one sets the value of ϕ when it doesn't interact with anything is a good question, but don't worry about that for now). Think of $j(x)$ as some function of \vec{x} and t which is arbitrary, but non-zero only over some limited region of space and for some limited amount of time. The action of the source produces the state,

$$|\Psi\rangle = \int d^4x j(x) \hat{\phi}(x) |0\rangle$$

Find the expression for the probability to observe a particle with 3-momentum \vec{p} from this state.