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# feynsect application

We compute generic Feynman diagrams with one and two loops using a numerical method developed in the course of the last three years. The main references are:

<http://www.slac.stanford.edu/spires/find/hep/www?eprint=hep-ph/0703282>

<http://www.slac.stanford.edu/spires/find/hep/www?eprint=hep-ph/0511176>

<http://www.slac.stanford.edu/spires/find/hep/www?eprint=hep-ph/0501130>

Feynman diagrams with loops were not thought to be calculable numerically due to the presence of mathematical singularities in the physical situations that we are interested in collider experiments. These are when the number of space-time dimensions is four and when the momenta of the particles in the diagrams are real (not complex). Our numerical method is an automated procedure which divides (sector decomposition) and deforms the integration region rendering these singularities in each Feynman diagram integrable with Monte-Carlo techniques.

Our first application will be the computation of the number of Higgs boson events at the LHC in the MSSM with two-loop precision. The problem is easily parallelizable and can use the Grid facility. We can parallelize in the values of the MSSM model parameters (Higgs mass, masses of squarks and quarks), the diagrams, and each individual sector.

## Gridified application

**current test: only 10 tasks (5 FLIBS, 2 inputs)**

Log in lcgui003.

1. AFS work area: `cd /afs/cern.ch/sw/arda/install/theory/feynsect`
2. `tcsh`
3. `source env.csh`
4. `diane.startjob2 -j`  
`$DIANE_USER_WORKSPACE/applications/feynsect/feynsect.job -w50@LCG`  
`--ganga -ORBEndPoint giop:tcp::4069 --wms=$PWD/ce_list`
5. killing the job: `diane.master.command kill`

Note:

- Testing on LSF: lcgui003 is not LSF client, go to another node (lxsl3) and run this:  
`diane.ganga.submitworkers -j`  
`$DIANE_USER_WORKSPACE/applications/feynsect/feynsect.job --nw=3`  
`--bk=LSF`

## meeting 06.06.2007

5-dimensional parameter space of 1000 points (P). A point is described by input.txt file in FLIB directory.

Each P may be computed in parallel in N-independent "diagrams" (D). Each D corresponds to a different source code (software.tgz).

The structure of the software directory:

- `FLIB_i` : simulation of i-th D
- CUBA: integrator (does not depend on D nor P)

-- JakubMoscicki - 06 Jun 2007

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This topic: ArdaGrid > Feynsect

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