The E852 Monte Carlo Package

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Four steps to running the Monte Carlo.

1. You must generate the four vectors for the reaction in which you are interested by using the ND version or the BNL version of SAGE. The ND version was written and is maintained by Neal Cason. It produces an ascii file. Dennis Weygand and/or Sasha Ostrovidov wrote the BNL version, the output of which is in itape format. Both versions are based on the same program and supposedly give the same results. If you have problems running SAGE, Dennis or Neal should be able to help you.

2. Go to the directory that you are going to run geant in and type "gumap -r#" at the command line. Where # is the runNo you wish to simulate. The default monte carlo runNo is 7000. Gumap reads the map and produces configuration files for geant. The e852 environmental variables need to be set before you run gumap. The files this program produces are: mappos.runNo (ascii file of the detector positions), space.runNo (ascii file of parameters for the drift chambers), and wiret0.runNo (binary file of t0's and d0's for every wire in the drift chambers). This program only has to be run once in a given directory unless you want to simulate a different runNo.

3. Next type "e852geant" on the command line. This program is a perl script which sets up the input card to geant. e852geant prompts you at the command line for information used to turn features of geant on or off. It also prompts you for the name of the card it produces, the runNo and the complete directory name of the SAGE input file. The runNo you enter must be the same as the runNo you used as a command line argument for gumap. The output card is an ascii file, so once e852geant produces it, you can change it with your favorite text editor. Below is a more detailed discussion of the e852geant program.

4. Finally, type "geant < card" on the command line, where card is the name of the card file produced by e852geant. Geant produces an itape file as output. The itape can be run through any of the e852 software programs equipped to handle itapes: event, a1, dumpItape. More details on geant and the groups it produces are given below.

e852geant

e852geant prompts you for input from the command line. Here is a list of the questions you will be asked and a discription of the type of answer the program expects.

Enter the name you would like your geant input card called.
The suffix '.dat' will automatically be appended to the name.

> The output of e852geant is an ascii file. This file is used as input to geant.
> The name you enter here will be the name of this ascii file.

Which runNo would you like to simulate (7000 is the default MC runNo)?

> Hitting the return key will give you the default runNo 7000. If you want a
> different runNo enter it here.

Enter the COMPLETE PATH NAME of the sage file you want to use as input to geant.

> The need for the REACTION.DAT file has been replaced with this question.
> The path you specify must start with a "/". An example of this would be:
> /s/s7/e852/sage/etapz.sage

Enter the input format code of the sage file, 3 if using ND sage 5 if using BNL sage.

For each event geant reads the initial four vectors from a sage file. The format of these four vectors is different depending on whether the BNL or ND version of SAGE was run. This code tells geant which format of the SAGE file it will be reading.

How many events do you want to run?

Enter the number of events you want geant to run.

The geant output file name will be in the form XXXX.mcdat.
Enter a four lettered name you would like instead of XXXX.

This is the name of the itape output file produced by geant. This name must be four characters long and .mcdat will be appended to the end of the name.

Each detector takes one of the following flags:
0 = Detector does not exist in geant
1 = Only an air outline of the detector exists
2 = Complete detector exists, hits are not recorded
3 = Complete detector exists, hit is recorded when a particle srikes the detector but particle propagation is stopped at that point
4 = Full simulation of detector

Enter the appropriate flag for each detector then return.
Target (in this case 3 and 4 are equivalent, [3])

The flags are explained above. Striking the return key will give you the default value. The defaults turn on full simulation for the detectors that existed during the summer 94 run and turn off detectors that were absent from that run. The following is a list of the other detectors and there default values.

Tcyl ([4])
LGD ([4])
Drift Chambers ([4])
TPX's ([4])
CsI ([4])
DEA ([4])
Elastic Scatter Veto ([4])
Beam Veto ([4])
CPVA ([0])
CPVB ([4])
CPVC ([4])
Cerenkov ([0])

At the beginning of the card file produced by e852geant are several comments explaining the keys that geant will read from this card. When e852geant prompts you for input it is setting the value of a key. Some of the keys in the card file are hard coded since they shouldn't change from one topology to another. They are commented though, and the experienced geant user can change them. Here is a list of those comments.

C RUNG: reaction number from REACTION.DAT, first event number (always 2).
C triggers: number of events geant will run.
C PATH: Full name of sage file, can't start with a   must be a /.
C FORMAT: input format code, 3 if using ND generated sage file
C or 5 if using BNL sage.
C RNDM: initial random number seeds (odd integers).
C TIME: leave this flag alone unless you know what you are doing.
C WSTP: flag that turns the geant graphics on/off.
C (4 = X windows, 2 = metafile output, 0 = no graphics)
C WRX: unit number for ascii output, no output if 0.
C ITP: T = itape output on, F = itape output off.
C MCRN: Monte Carlo run number
C HBNM: prefix name of hbook and itape output files.
C FLD: 1 = full field, 0 = field off.

Geant allows you to turn physical processes on and off. e852geant adds the following comments to your card file. If you want to turn off any of the following processes edit the card file uncommenting the processes you want turned off.

C The following physical processes are set to their default geant
C values (on). Uncommenting them will turn them off. To do someting else
C refer to the geant manual.
C
C DCAY 0
C MULS 0
C LOSS 0
C PAIR 0
C BREM 0
C DRAY 0
C ANNI 0
C HADR 0

geant

When geant is run it will produce an itape output file. The name of the itape consists of the four lettered name you entered in e852geant with the suffix .mcdat appended to the end. The geant itape looks very simular to e852 data taken with the DAQ. Geant does not return ADC and TDC values so some differences from real data are unavoidable. Below is a list of the groups geant fills.

```
#define GROUP_MISC_ADCS            54    /* adc_values_t */
#define GROUP_TCYL_COORS          120    /* tcyl.h:tcylHits_t */
#define GROUP_LGD_MCHITS          209    /* lgd_hits_t */
#define GROUP_LGD_ADCS            210    /* adc_values_t */
#define GROUP_CSI_HITS            312    /* itypes.h:csi_hits_t */
#define GROUP_TPX123_PLANES       421    /* see itypes.h for definitions */
#define GROUP_TPX123_HITS         422
#define GROUP_MPSDC_PLANES        431    /* see itypes.h for definitions */
#define GROUP_MPSDC_HITS          432
#define GROUP_TDX4_TDCS           461    /* tdc_values_t */
#define GROUP_MONTECARLO_EVENT    700    /* event_t with SAGE Monte Carlo event */
#define GROUP_BEAM_RECORD         710
#define GROUP_MONTECARLO_TRACKS   721    /* tracks_t (see tracking.h) */
```