# Background merging

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# Backgrounds

Assume 100 ns time window (depends on electronics etc.). Then at 50 μA, # electrons = 3.12e7 e-/window.

GEMC has ability to generate background electrons on target accompanying each primary event. However, 3e7 e- background electrons per primary event is a lot.

GEMC also can save a LUND file containing information on tracks that hit detectors in an event. Then these can be merged into a new simulation. This is less resource intensive than re-simulating from primary tracks.

# Tests

As a test, we have LUND output files for:

1000 e- on target per event (30000 events)

10000 e- on target per event (3000 events)

with 30 ns time window and SIDIS geometry

solid_gemc solid.gcard -USE_GUI=0 -BEAM_P="e-,11*GeV,0*deg,0*deg" -SPREAD_P="0*GeV,0*deg,0*deg" -BEAM_V="(0,0,-400)cm" -SPREAD_V="(0.21,0)cm" -OUTPUT="evio,out.evio" -LUMI_P="e-,11*GeV,0*deg,0*deg" -LUMI_V="(0,0,-400)cm" -LUMI_SPREAD_V="(0.21,0)cm" -LUMI_EVENT="9999,30*ns,2*ns" -SAVE_ALL_MOTHERS=2 -RECORD_PASSBY=1 -N=3000

These can be merged with DIS primaries

solid_gemc solid_SIDIS_He3_full.gcard -USE_GUI=0 -INPUT_GEN_FILE="lund,Input/SIDIS_He3-00.lund" -OUTPUT="evio,Generate/sidis-200.ev" -MERGE_LUND_BG="Generate/background.200.dat" -N=3000

# Problems

## Warnings in GEMC:

```
 Beam Settings >>  Particle id 1000060110 not found in G4 table.
 Beam Settings >>  Particle id -46 not found in G4 table.
 Beam Settings >>  Particle id 0 not found in G4 table.
 Beam Settings >>  Particle id 1000040090 not found in G4 table.
-------- WWWW ------- G4Exception-START -------- WWWW -------
*** G4Exception : Event0102
      issued by : G4ParticleGun::SetParticleDefinition()
G4ParticleGun does not support shooting a short-lived particle without a valid decay table.
G4ParticleGun::SetParticleDefinition for anti_d_quark is ignored.

*** This is just a warning message. ***
-------- WWWW -------- G4Exception-END --------- WWWW -------
```

Particle IDs generated in GEMC background simulation and written to LUND file are not recognized for particle gun?

# Problems

## evio2root failure (for 1 of 10 runs with 10000 e-/event):

```
?evioException type = 0x40730001    text = evioFileChannel::read...read errorS_EVFILE_TRUNC:  event
truncated, insufficient buffer space


    evioException occured in file src/libsrc++/evioFileChannel.cc, function read, line 179
```

Apparently some buffer limit is being exceeded with 10000 e-/event. We're talking about 3e7 e-/event! Is this even feasible?