Import particles into Genesis

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First (primary) approach: import particles into Genesis

- Genesis requires each slice has the same number of particles, which is usually not satisfied when importing particles from beam dynamics simulation.

- This approach get around the issue by adding particles with negative energy (gamma=-1) since Genesis ignores particles with negative energy, i.e treat them as lost particles.

- When using this approach, we set curlen=0 (or negative values) so that the local current is proportional to the number of imported particles with positive energies.

    local current = curpeak * npart / npart0

Import particles using PARTFILE, NWIG=1
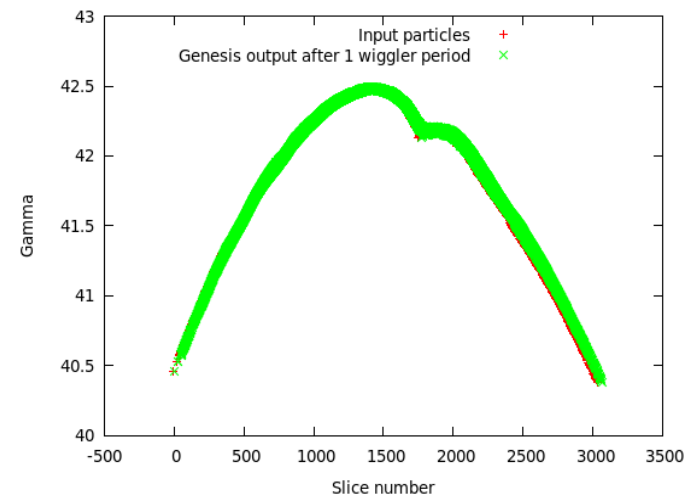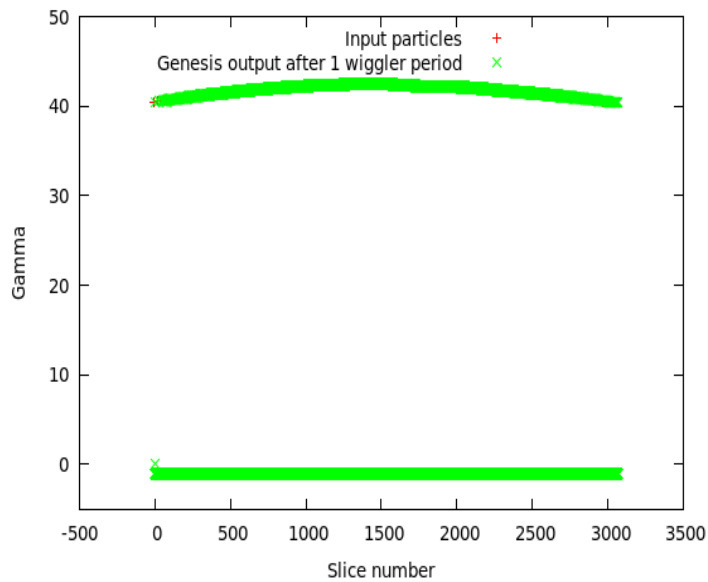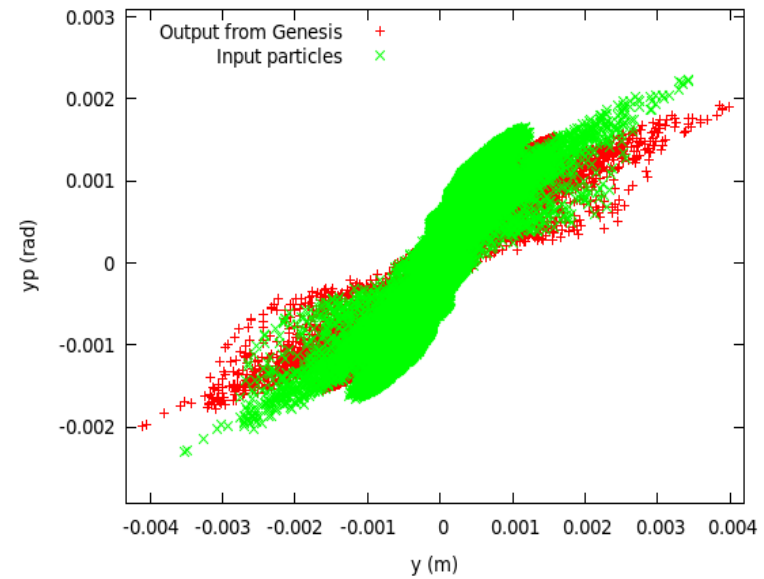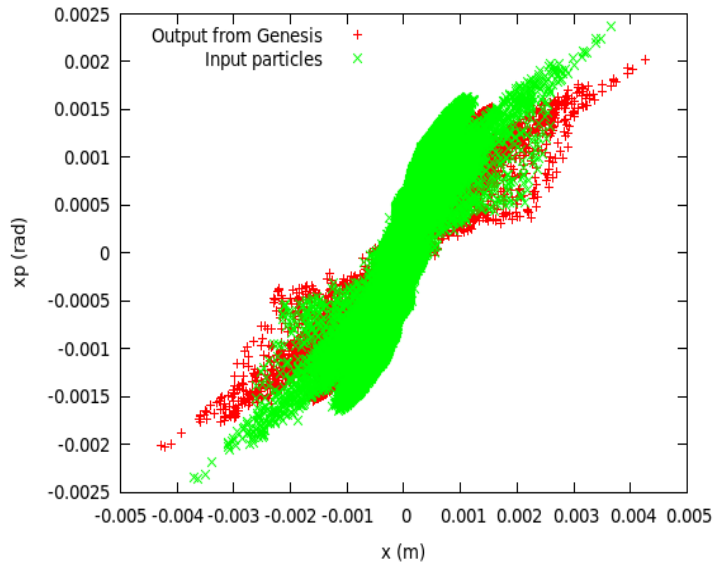
There was a problem with mpi, which is solved the the following modification

```fortran
c       writing the record
c
        j=6*(islice-firstout-1)+1
c
        if (mpi_size.gt.1) then   ! creata temporary files
          ndmp2tmp=ndmp2
          ndmp2=ndmp2+30
          open(ndmp2,file=outputfile(1:strlen(outputfile))
     +              //'.dpa'//file_id,
     +        status='unknown',access='direct',
cgw  +          recl=npart*8,err=100)
     +        recl=npart0*8,err=100)
          j=1
        endif
c
        write(ndmp2,rec=j)   (gamma(i),i=1,npart0)
        write(ndmp2,rec=j+1) (theta(i),i=1,npart0)
        write(ndmp2,rec=j+2) (xpart(i)/xkper0,i=1,npart0)
        write(ndmp2,rec=j+3) (ypart(i)/xkper0,i=1,npart0)
        write(ndmp2,rec=j+4) (px(i),i=1,npart0)
        write(ndmp2,rec=j+5) (py(i),i=1,npart0)
c
        if (mpi_size.gt.1) then
          close(ndmp2)
          ndmp2=ndmp2tmp
        endif
      endif
c
c     field distribution
c
      if (idmpfld.eq.0) return
c
c     problems arise if the dump is used for another run
-(DOS)---  output.f      67% L800   (Fortran)
```

May be a typo in the original code?

Another approach: Import Distribution Into Genesis Using DISTFILE

- When using DISTFILE, Genesis read in the particles, make mirror particles and then add particles so that the number of particles in each slice is equal (=npart in .in file).
- The advantages is one can generate as many as particles needed within Genesis and hence easy to incoporate the slice from modulator simulation.
- The disadvantage is that macro-particles from difference slice will have different charge, which may require modification of the kicker code.

NTAIL=5, NSLICE=3000, NWIG=1
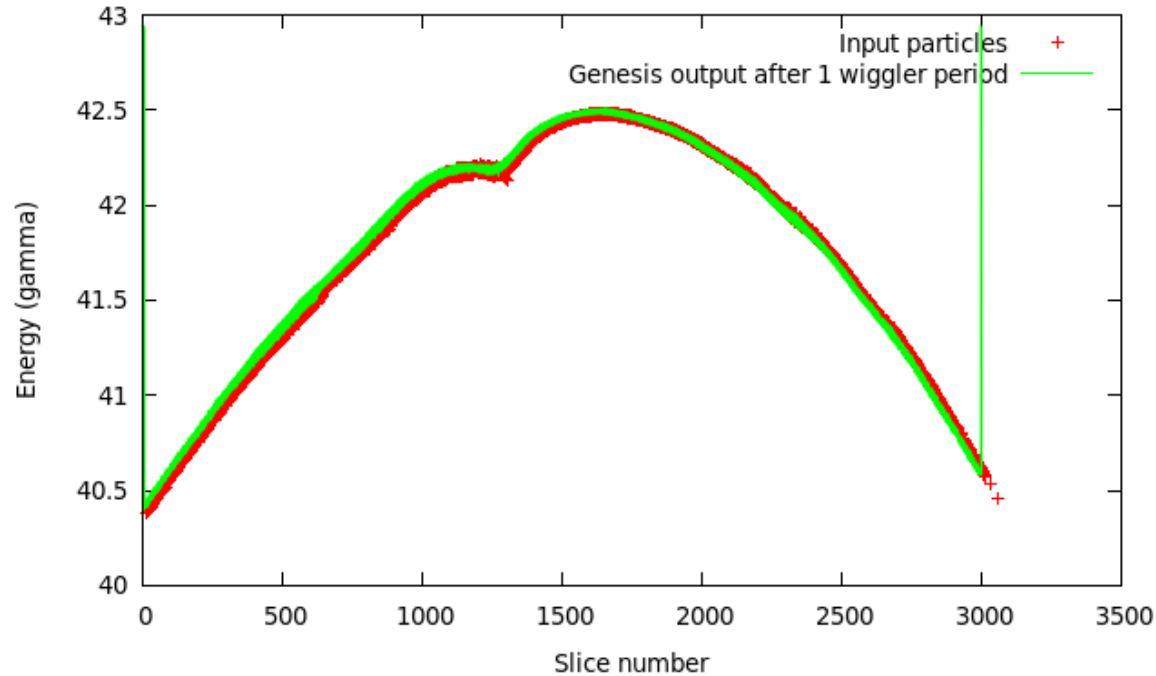
- One need to vary NTAIL and NSLICE to choose desired longitudinal range of the distribution.
- The .dpa and .dfl files needs to be deleted before any Genesis run to get the correct particle distributions.

NTAIL=5, NSLICE=3000, NWIG=1