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# Elegant - old version

This page describes an old version of Elegant (used up to CMSSW 4.2.4). For the up-to-date version, see CompElegant.

Generates p-p and ap-p elastic scattering events according to one of the available hadronic and Coulomb-interference models.

## Hadronic models

- Islam et al. According to Int.J.Mod.Phys.A21:1-42,2006. Tags `islam_bfkl` (for the BFKL/hard pomeron version) or `islam_cgc` (for the color-glass-condensate version).
- Petrov, Predazzi, Prokudin. According to Eur.Phys.J.C28:525-533,2003. There are two versions implemented - with 2 pomerons (tag `ppp2`) and with 3 pomerons (tag `ppp3`).
- Bourrely, Soffer, Wu. According to Eur.Phys.J.C28:97-105, 2003. Tag `bsw`.
- Block, Halzen. According to Phys.Rev.D60:054024,1999. Tag `bh`.
- Jenkovszky et al. According to arXiv:1105.1202 (2011). Tag `jenkovszky`.
- simple exponential, tag `exp`.

## Coulomb-interference models

- West-Yennie, see Phys.Rev.172:1413-1422,1968. Tag `wy`.
- Kundrať-Lokajíček, see e.g. Z.Phys.C63:619-630,1994. Tag `KL`.

Besides those, the Elegant recognizes these tags

- `PH` to neglect the Coulomb-interference and take a hadronic model only and
- `PC` to take only the Coulomb amplitude and neglect hadronic scattering.

## ElegantCDFBuilder

Before the actual event generation, one has to calculate CDFs (cumulative distribution functions) for the energy of interest. They're stored in ROOT files under the `Elegant/data` directory. It is very likely that all files you need, would be already there. If not, you can use `python/ElegantCDFBuilder_cfg.py` to do it yourself.

## Naming schemes

The CDF ROOT files follow this convention

```
<E>_<t|_min>_<t|_max>_<number of sampling points>.root
```

where `E` stands for beam energy in GeV (i.e. half of cms energy) and `t_min` and `t_max` are the boundaries of supported t-range in  $\text{GeV}^2$ .

For `ElegantSource`, the CDF choice is in the form

```
<coulomb-interaction tag>/<hadronic-model tag>
```

for example `KL/ppp3`.

## The recommended usage of ElegantSource

As for every energy there is one preferred/default ROOT file with CDFs, the `ElegantSource_cfi.py` includes function `ElegantDefaultFileName(energy)` which returns the default filename for the given energy (string parameter). Hence a recommended usage is as follows

```
energy = "3500"
...
import IOMC.Elegant.ElegantSource_cfi
process.generator = IOMC.Elegant.ElegantSource_cfi.generator
process.generator.fileName = IOMC.Elegant.ElegantSource_cfi.ElegantDefaultFileName(energy)
process.generator.verbosity = ...
...
```

## ElegantCalculateDetails

`ElegantCalculateDetails` is a plugin that can take any of the ROOT files in the `data` directory and calculate some more detailed quantities like  $B(t)$ ,  $\rho(t)$ , etc. These would be stored in a file with `.details.root` extension.

## makePlots.asy

`makePlots.asy` is an Asymptote [script](#) that takes the `.root` and `.details.root` files and converts them into a PDF with a standard set of plots.

-- JanKaspar - 23-Oct-2009

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This topic: TOTEM > CompElegantOld

Topic revision: r1 - 2013-09-19 - JanKaspar



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