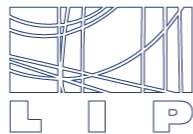


# ROOT intermediate tutorial

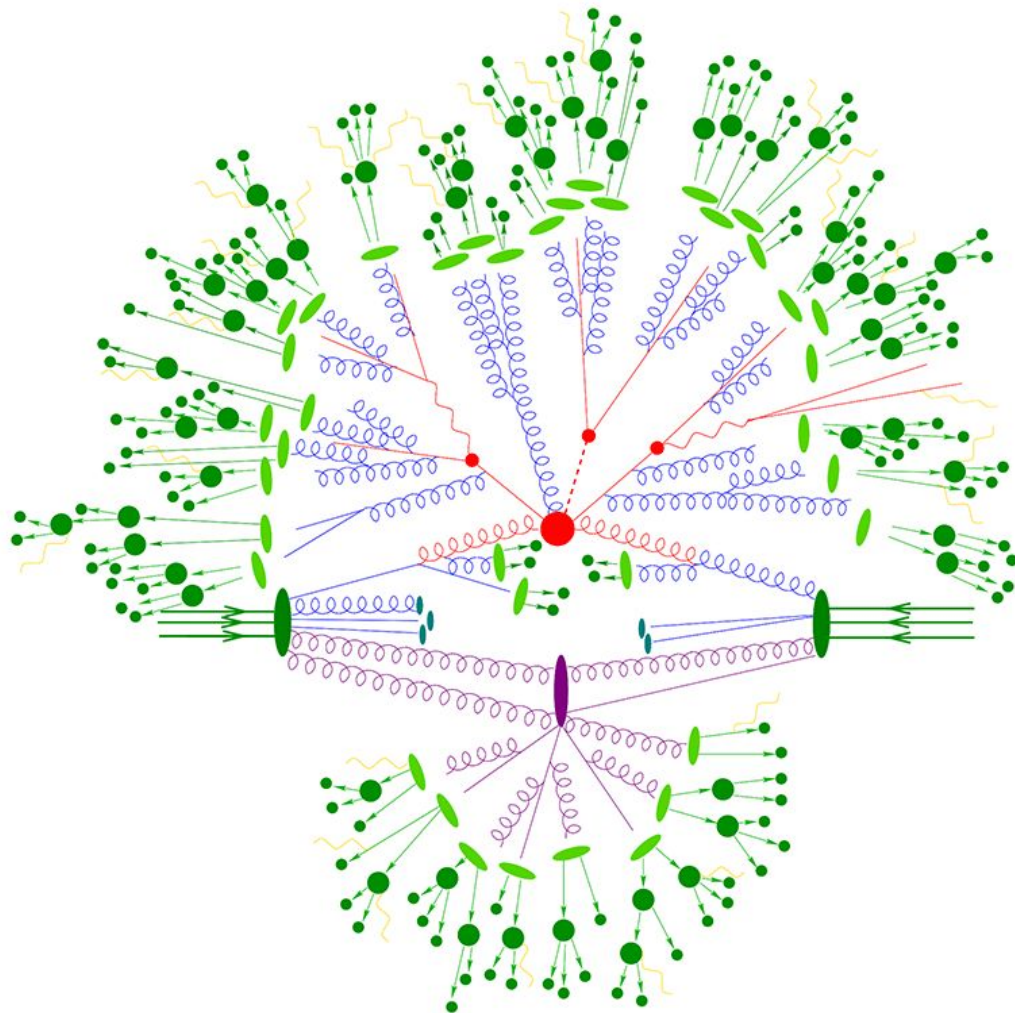
LIP Summer Internships, July 7th 2021



LABORATÓRIO DE INSTRUMENTAÇÃO  
E FÍSICA EXPERIMENTAL DE PARTÍCULAS

# Some words on Monte Carlo event generators

- Monte Carlo event generators provide detailed simulations of high-energy collisions (events) and are used in almost all high energy physics analysis
- Each event is simulated in several steps
  - Signal process
  - Final state parton shower
  - Fragmentation
  - Hadron decays
  - Underlying event
- For each event, they return a list of the generated particles and their kinematic properties
- The data file for today's tutorial is a simplifies version of this



# Structure and content of the data file

```
*****
*Tree   :Tdata   : zedjet_oldpythia_200.cmdTdata *
*Entries : 663048 : Total = 4051393563 bytes File Size = 3263504642 *
*       :         : Tree compression factor = 1.24 *
*****
*Br    0 :px     : vector<double> *
*Entries : 663048 : Total Size= 720320231 bytes File Size = 696582956 *
*Baskets : 323   : Basket Size= 6620672 bytes Compression= 1.03 *
*.....*
*Br    1 :py     : vector<double> *
*Entries : 663048 : Total Size= 720320231 bytes File Size = 696579788 *
*Baskets : 323   : Basket Size= 6620672 bytes Compression= 1.03 *
*.....*
*Br    2 :pz     : vector<double> *
*Entries : 663048 : Total Size= 720320231 bytes File Size = 698719314 *
*Baskets : 323   : Basket Size= 6620672 bytes Compression= 1.03 *
*.....*
*Br    3 :En     : vector<double> *
*Entries : 663048 : Total Size= 720320235 bytes File Size = 689999546 *
*Baskets : 323   : Basket Size= 6620672 bytes Compression= 1.04 *
*.....*
*Br    4 :m      : vector<double> *
*Entries : 663048 : Total Size= 720320098 bytes File Size = 423388281 *
*Baskets : 325   : Basket Size= 6620160 bytes Compression= 1.70 *
*.....*
```

Branch: stores information about a specific property of the event

For each event, there are multiple particles, whose properties are stored in a vector

Your job today is to go through the list of particles in each event and find the muons that come from the decay of a Z boson