Final State Rotation

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Questions

- Does each our model providing phi symmetry or not
- Can we simply remove random rotation of final state?
- Some models will give an assymetry?
- Does our interface to models provide a possibility for spin dependent interactions?

What we are doing now

```
G4HadronicProcess.cc
163 G4VParticleChange *G4HadronicProcess::PostStepDoIt(
164 const G4Track &aTrack, const G4Step &)
{
,,,
253 // Initialize the hadronic projectile from the track
254
255 G4HadProjectile thePro(aTrack); thePro only has pz
,,,
362 FillTotalResult(result, aTrack);
,,,
}
```

```
G4HadProjectile.hh
36 class G4HadProjectile
37 {
38 public:
39 G4HadProjectile(const G4Track &aT);
40 G4HadProjectile(const G4DynamicParticle &aT);
41 const G4Material * GetMaterial() const;
42 const G4ParticleDefinition * GetDefinition() const;
43 const G4LorentzVector & Get4Momentum() const {return theMom;}
44 G4LorentzRotation & GetTrafoToLab() {return toLabFrame;}
45 G4double GetKineticEnergy() const;
46 G4double GetTotalEnergy() const;
47 G4double GetTotalMomentum() const;
48 G4double GetGlobalTime() const {return theTime;}
```

```
G4HadronicProcess.cc
480 void
481 G4HadronicProcess::FillTotalResult(G4HadFinalState * aR, const G4Track & aT)
{
,,,
489 G4double rotation = 2.*pi*G4UniformRand();
,,,                 for projectile
610 newP4.rotate(rotation, it);
,,,                 for secondaries
618 theM.rotate(rotation, it);
,,,
}
```

Expected answers to the questions

- Does each our model providing phi symmetry or not
  - No
- Can we simply remove random rotation of final state
  - No
- Some models will give an assymetry?
  - No
- Does our interface to models provide a possibility for spin dependent interactions?
  - No

Possible solution

- Add an attribute to the model for deterrent the rotation in a process.
- Checking this attribute before the random rotation in the process.
- Models can know only global direction.
  - Makes difficult to create spin dependent interactions