Subject: Pion off Nuclei [quasi-free]
Posted by Ingo Froehlich on Mon, 16 Apr 2012 14:39:53 GMT

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Just a macro which adds the quasi-free (pi- + p) reaction to Pluto:

```
{

   //Add our quasi-free composite:
   makeStaticData()->AddParticle(14009, "pi- + p",0.938272+0.139570);
   //Creates just a symbolic link:
   makeStaticData()->AddAlias("pi- + p","pi-+p");

   //Executes the fermi plugin which adds also nuclei:
   makeDistributionManager()->Exec("nucleus_fermi");

   //Add a new composite particle (target_id*1000 * beam_id)
   //N.B. that "nucleus_fermi" has already added the 12C (with id=614)
   makeStaticData()->AddParticle(614009,"pi- + 12C",11.174862+0.139570);
   //Creates again a symbolic link:
   makeStaticData()->AddAlias("pi- + 12C","pi-+12C");

   //adds a decay by using the "pi- + 12C" particle as created above:
   makeStaticData()->AddDecay(-1, "pi- + 12C -> (pi- + p) + 11B (quasi-free)","pi- + 12C","pi- +
p,11B", 1.0 );

   //This is the fermi model (contributed by M. Dieterle and L. Witthauer, Basel):
   PFermiMomentumGA * pmodel = new PFermiMomentumGA("pi-p_in_12C@pi- +
12C_to_pi- + p_11B", "Quasi-free particle production <nucleus_fermi>",-1);
   pmodel->Add("q,parent");
   pmodel->Add("pi-,grandparent,beam");
   pmodel->Add("12C,grandparent,target");
   pmodel->Add("11B,daughter,spectator");
   pmodel->Add("q,daughter,composite");
   pmodel->Add("p,granddaughter,participant");
   pmodel->Add("pi-,granddaughter,p2");
   makeDistributionManager()->Add(pmodel);

   //This is our reaction, in this case just a quasi-free elastic reaction:
   PReaction *Reac = new PReaction ("_P1=3.5","pi-","12C","(pi- p) pi- p (11B)","filename");

   TH2F * histo2 = new TH2F ("histo2","Rap. vs. Pt",50,-1.5,3.5, 50,0,1.5);
   Reac->Do(histo2,"foreach(pi-); _x = [pi-]->Rapidity(); _y=[pi-]->Pt(); ");

   Reac->Print();
   Reac->loop(1000);  // Number of events

   histo2->Draw("colz");

}
```
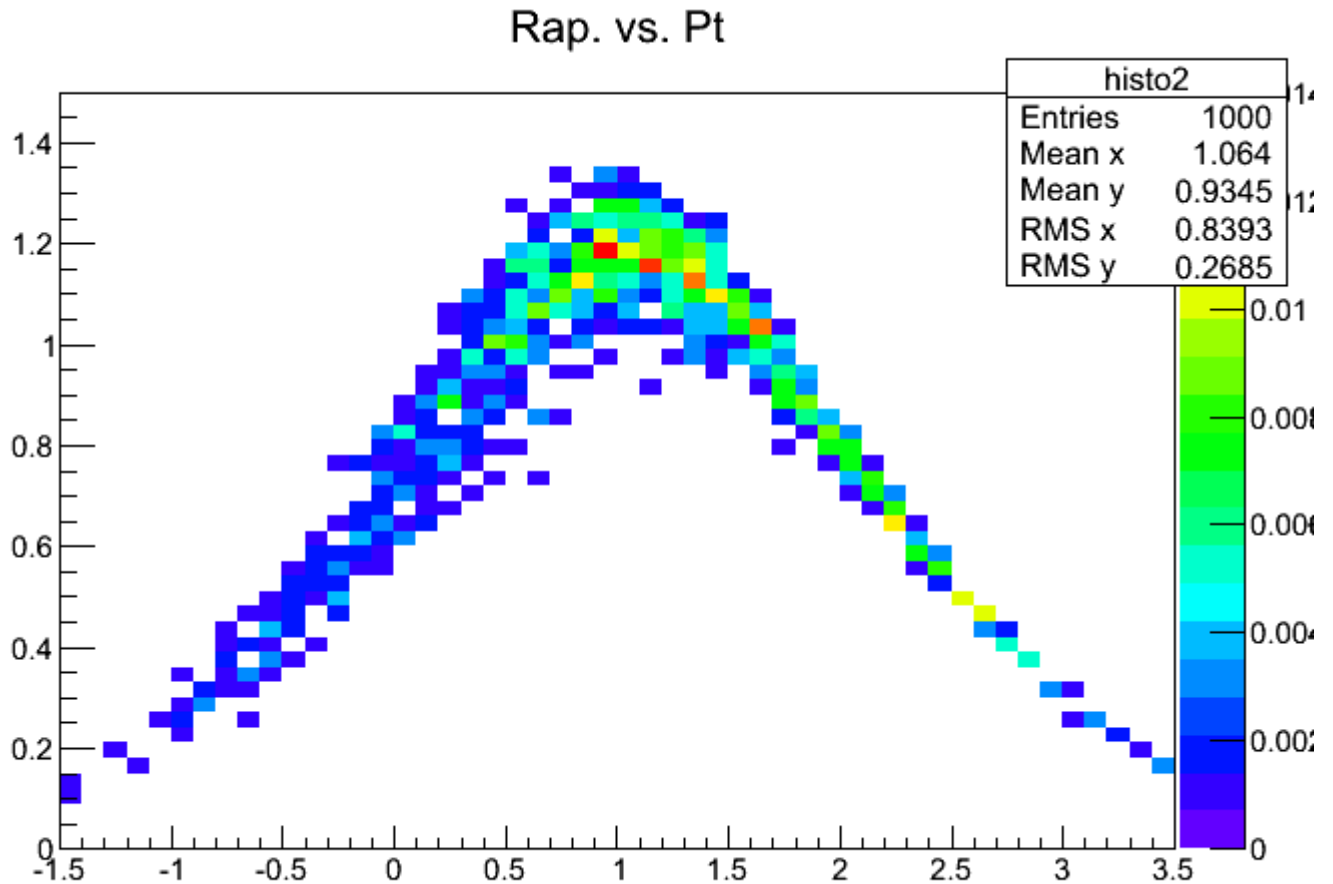
The nucleus_fermi plugin supports already gamma and proton beams - I think in the future I

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will add the pion beam as well, but at the moment the macro above should do the job (it needs some adaptions of course to other cases like pi+ + n)

For completeness, this is the result:

Rap. vs. Pt

Subject: Re: Pion off Nuclei [quasi-free]
Posted by Johannes Siebenson on Tue, 17 Apr 2012 07:26:35 GMT
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Hello Ingo,
do I need latest PLUTO version for that macro? I tried to run it with v5.34 but it does not do its job. There is a message:

Warning in <PNucleusFermiPlugin::Exec>: Syntax error:
Info in <PStaticData::AddDecay>: (ALLOCATION) Decay index 614009: pi- + 12C -> (pi- + p) + 11B (quasi-free)

and i the end there comes a message:

PReaction: calculating widths in PData...
PReaction: insufficient energy
 100% done in 0.009896 sec

Thanks a lot in advance

Subject: Re: Pion off Nuclei [quasi-free]
Posted by Ingo Froehlich on Tue, 17 Apr 2012 07:55:40 GMT
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It's better to use the latest stable version. 5.34 is quite old

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Subject: Re: Pion off Nuclei [quasi-free]
Posted by Johannes Siebenson on Tue, 17 Apr 2012 12:09:04 GMT
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Hello,
ok with Pluto v5.40 it semms to work. But now I tried to include production of Lambda and K0S
and somehow this does not work. I probably do something wrong. Could you tell me what?

//Add our quasi-free composite:
   makeStaticData()->AddParticle(14009, "pi-p",0.938272+0.139570);
   //Creates just a symbolic link:
   makeStaticData()->AddAlias("pi- + p","pi-+p");

   //Add our quasi-free composite:
   makeStaticData()->AddParticle(18016, "Lambda + K0S",1.115683+0.497672);
   //Creates just a symbolic link:
   makeStaticData()->AddAlias("Lambda + K0S","Lambda+K0S");

   //Executes the fermi plugin which adds also nuclei:
   makeDistributionManager()->Exec("nucleus_fermi");

   //Add a new composite particle (target_id*1000 * beam_id)
   //N.B. that "nucleus_fermi" has already added the 12C (with id=614)
   makeStaticData()->AddParticle(614009,"pi- + 12C",11.174862+0.139570);
   //Creates again a symbolic link:
   makeStaticData()->AddAlias("pi- + 12C","pi-+12C");

   //adds a decay by using the "pi- + 12C" particle as created above:
   makeStaticData()->AddDecay(-1, "pi- + 12C -> (K0S + Lambda) + 11B (quasi-free)","pi- +
12C","Lambda + K0S,11B", 1.0);

   //This is the fermi model (contributed by M. Dieterle and L. Witthauer, Basel):
   PFermiMomentumGA * pmodel = new PFermiMomentumGA("pi-p_in_12C@pi- +

```
12C_to_Lambda + K0S_11B", "Quasi-free particle production <nucleus_fermi>",-1);
   pmodel->Add("q,parent");
   pmodel->Add("pi-,grandparent,beam");
   pmodel->Add("12C,grandparent,target");
   pmodel->Add("11B,daughter,spectator");
   pmodel->Add("q,daughter,composite");
   pmodel->Add("Lambda,granddaughter,participant");
   pmodel->Add("K0S,granddaughter,p2");
   makeDistributionManager()->Add(pmodel);

   //This is our reaction, in this case just a quasi-free elastic reaction:
   PReaction *Reac = new PReaction ("_P1=3.6","pi-","12C","(pi- p) Lambda K0S
(11B)","filename");

   //TH2F * histo2 = new TH2F ("histo2","Rap. vs. Pt",50,-1.5,3.5, 50,0,1.5);
   //Reac->Do(histo2,"foreach(pi-); _x = [pi-]->Rapidity(); _y=[pi-]->Pt(); ");

   Reac->Print();
   Reac->loop(1000);  // Number of events

   //histo2->Draw("colz");
```

Subject: Re: Pion off Nuclei [quasi-free]
Posted by Ingo Froehlich on Tue, 17 Apr 2012 13:25:44 GMT

The composites must stay "pi- + 12C" and "pi- + p", this is your envelope and quasi-free reaction (in fact you try now a K0S beam...)

```
makeStaticData()->AddDecay(-1, "pi- + 12C -> (pi- + p) + 11B (quasi-free)","pi- + 12C","pi- +
p,11B", 1.0 );
```

This line has a "pi- + 12C" composite as an input, and a 11B fragment and the "pi- + p" quasi-free reaction particle as daughters.

Consequence: everything in the original macro above the PReaction declaration must be unchanged (but only if you don't want to use pi+ + n, e.g.)

(Edit) This is the chain:

```
 Reaction of 5 Particles interacting via 2 Channels
   Reaction Particles:
     0. quasi-particle (pi- beam and 12C target)
     1. pi- + p
     2. 11B
     3. K0S
     4. Lambda
   Reaction Channels:
     1. pi- + 12C -> (pi- + p) + 11B (quasi-free)
       Interaction model(s):
```

[pi-p_in_12C] Quasi-free particle production <nucleus_fermi> {/}
2. pi- + p --> K0S + Lambda
   Interaction model(s):
   [pi- + p_fix_K0S_Lambda] 2-body fixed mass, partial width {/}
   [pi- + p_genbod_K0S_Lambda] Pluto build-in genbod {/genbod}

Subject: Re: Pion off Nuclei [quasi-free]
Posted by Johannes Siebenson on Tue, 17 Apr 2012 15:06:01 GMT
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Now it works. Thanks a lot