
Subject: [SOLVED]Eta Prime decay via rho dilepton
Posted by [Michael Kunkel](#) on Sun, 25 Aug 2013 22:14:38 GMT
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Greetings,

I am trying to simulate the reaction $g + p \rightarrow p \eta'$; $\eta' \rightarrow \rho$ dilepton; $\rho \rightarrow \pi^+ \pi^-$.

When I do this I have to set a `PInclusiveModel` for the dilepton, or there is no distribution. Here is a plot without setting a `PInclusiveModel`.

The problem is when setting this `PInclusiveModel`, the invariant mass of $\pi^+\pi^-$ is not longer rho but instead a distribution.

Here is a working code.

```
##include "loadPluto.h";
//Author Michael C. Kunkel
#include "TH1.h"
#include "TH2.h"
#include "TH3.h"
#include "TChain.h"
#include "TCanvas.h"
#include "TF1.h"
#include "/Users/Mike/Pluto/pluto_v5.42/src/PParticle.h"
#include "/Users/Mike/Pluto/pluto_v5.42/src/PReaction.h"
#include "/Users/Mike/Pluto/pluto_v5.42/src/PBeamSmearing.h"
#include "/Users/Mike/Pluto/pluto_v5.42/src/PAnyDistribution.h"

void SIMULATE_EtaPrime_Dalitz(){

    makeStaticData()->AddDecay(-1, "eta' -> rho0 + dilepton ", "eta'", "rho0,dilepton",0.0009);

    //TF1 object representing the di-lepton statistics:
    TF1 *flat = new TF1("flat","1",0,1);

    //The "PInclusiveModel" can be used as a generator:
    PInclusiveModel *dilepton_generator = new
    PInclusiveModel("flat@eta'_to_rho0_dilepton/generator","Dilepton generator",-1);

    //The distribution template:
    dilepton_generator->Add("eta',parent");
    dilepton_generator->Add("rho0,daughter");
    dilepton_generator->Add("dilepton,daughter,primary");
    dilepton_generator->SetSampleFunction(flat);

    //Enable distribution as a generator
```

```

//dilepton_generator->EnableGenerator();
makeDistributionManager()->Add(dilepton_generator);

double ebeam_min = 1.1725;
double ebeam_max = 5.44575;
PBeamSmearing *beam_smear = new PBeamSmearing("beam_smear", "Beam smearing");
TF1* beam_smear_fn = new TF1("beam_smear_fn", "1./x", ebeam_min, ebeam_max);

beam_smear->SetReaction("g + p");
beam_smear->SetMomentumFunction(beam_smear_fn);
makeDistributionManager()->Add(beam_smear);

gROOT->Reset();
//PUtils::SetSeed(123); //this is to have a fixed SEED. By default, the systime is used...

PReaction my_reaction("_P1 = 2.2", "g", "p", "p eta' [dilepton [e+ e-] rho0 [pi+
pi-]]", "etaP_Aphi", 1, 0, 1, 1);

TH1F * histo2 = new TH1F ("histo2", "IM e+ e-", 100, 0.0, 0.4);
TH1F * histo3 = new TH1F ("histo3", "IM pi+ pi-", 100, 0.0, 1);

my_reaction.Preheating(100);

my_reaction.Do(histo2, "_w =1;_x = ([dilepton])->M() ");
my_reaction.Do(histo3, "_w =1;_x = ([pi+] + [pi-])->M() ");
my_reaction.Loop(10000);

TCanvas *c1 = new TCanvas("c1", "c1");
c1->Divide(1, 2);
c1->cd(1);
histo2->Draw();
c1->cd(2);
histo3->Draw();
c1->Print("mass_spectrum.jpeg");

}

```

File Attachments

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- 1) [mass_spectrum.jpeg](#), downloaded 518 times
 - 2) [mass_spectrum_nodilep_dist.jpeg](#), downloaded 484 times
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