Srážky světla na LHC

Autoři:

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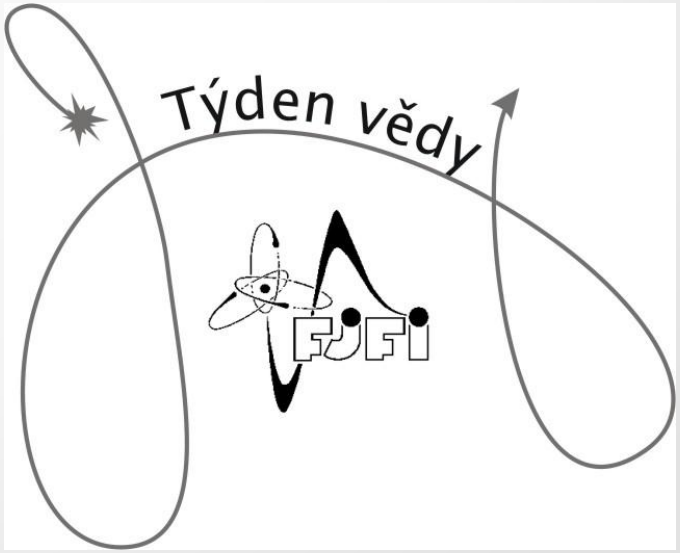
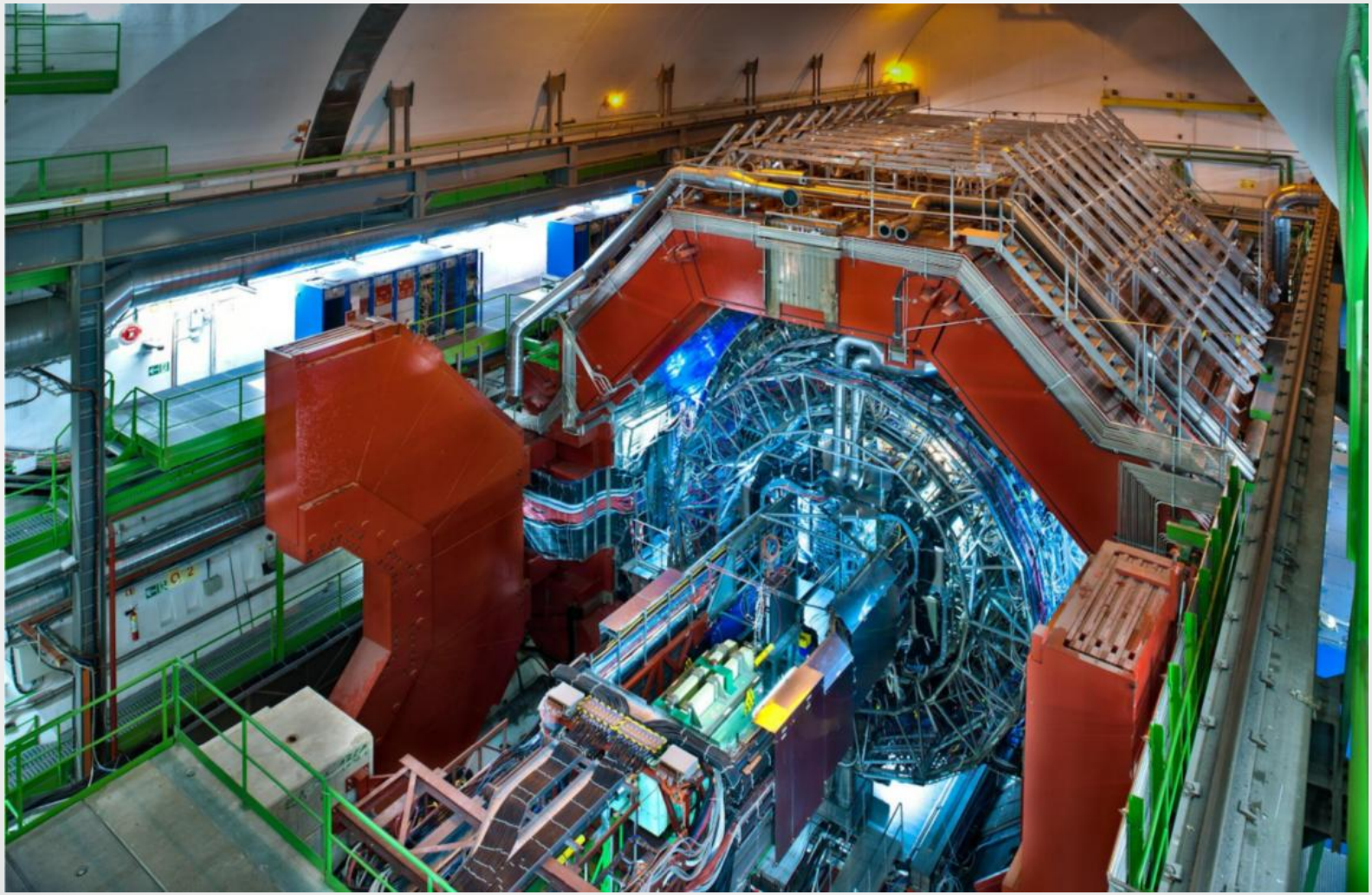
Supervisor:

Jaroslav Adam



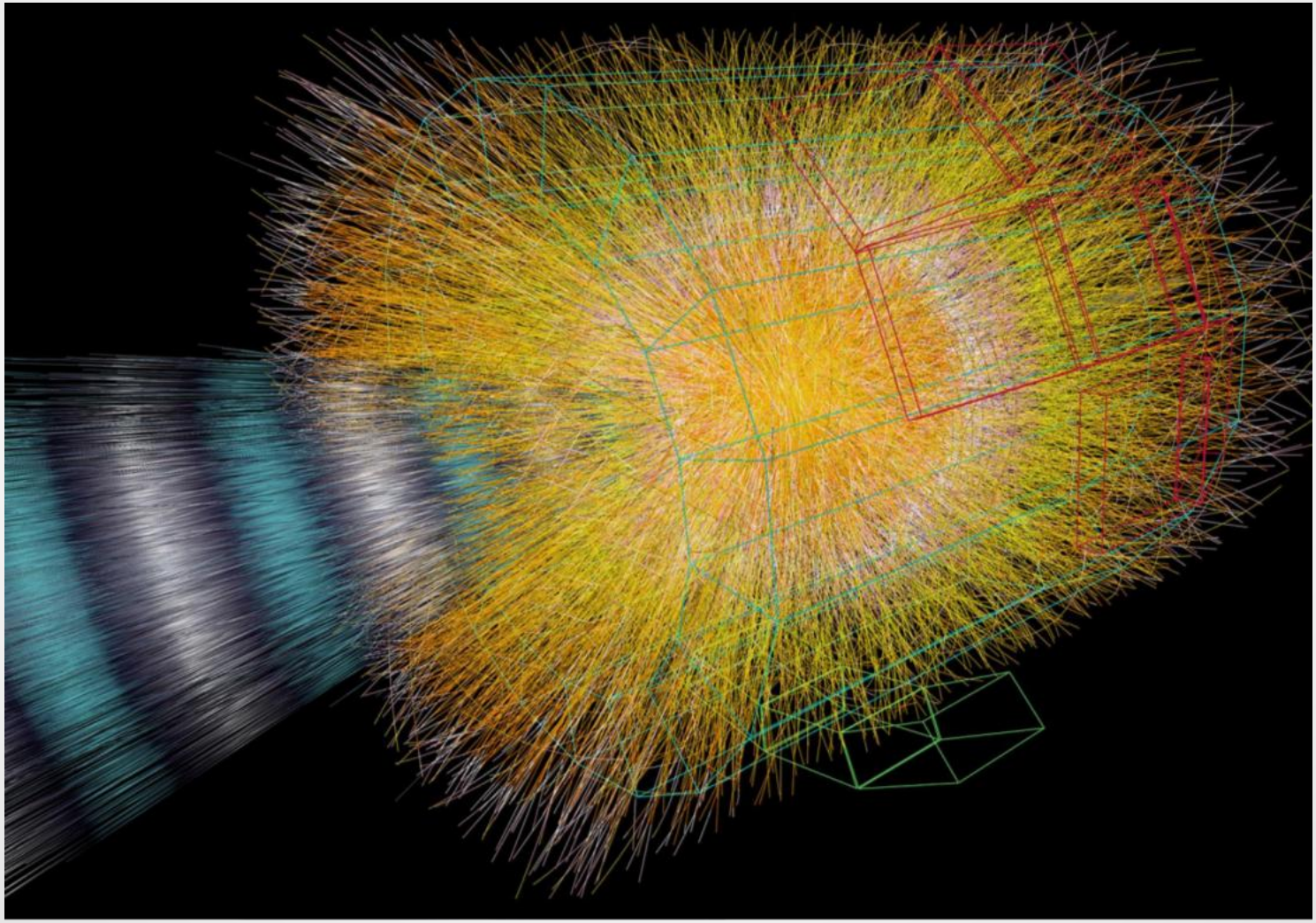
Co je to ALICE

ALICE

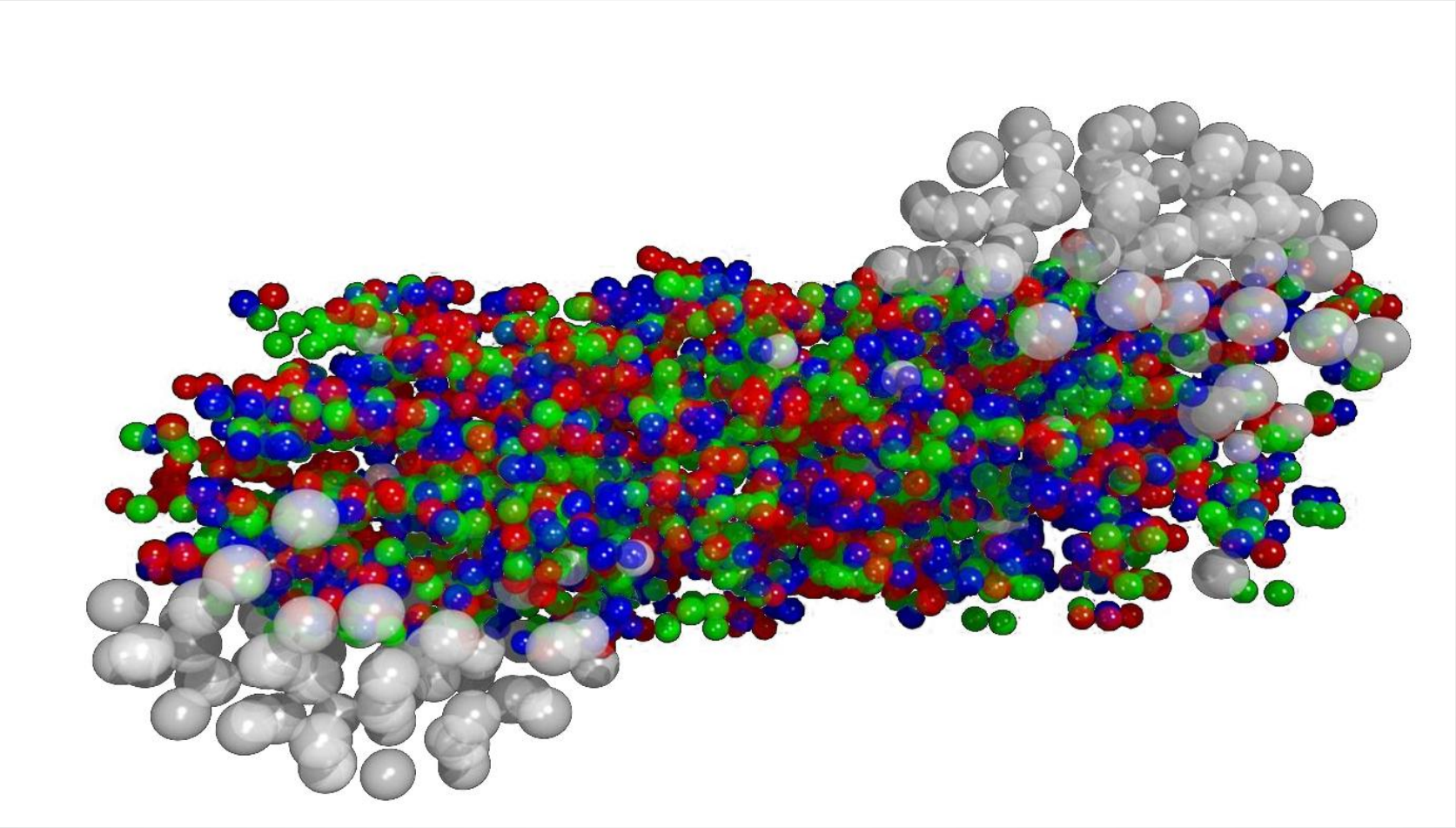


Srážky

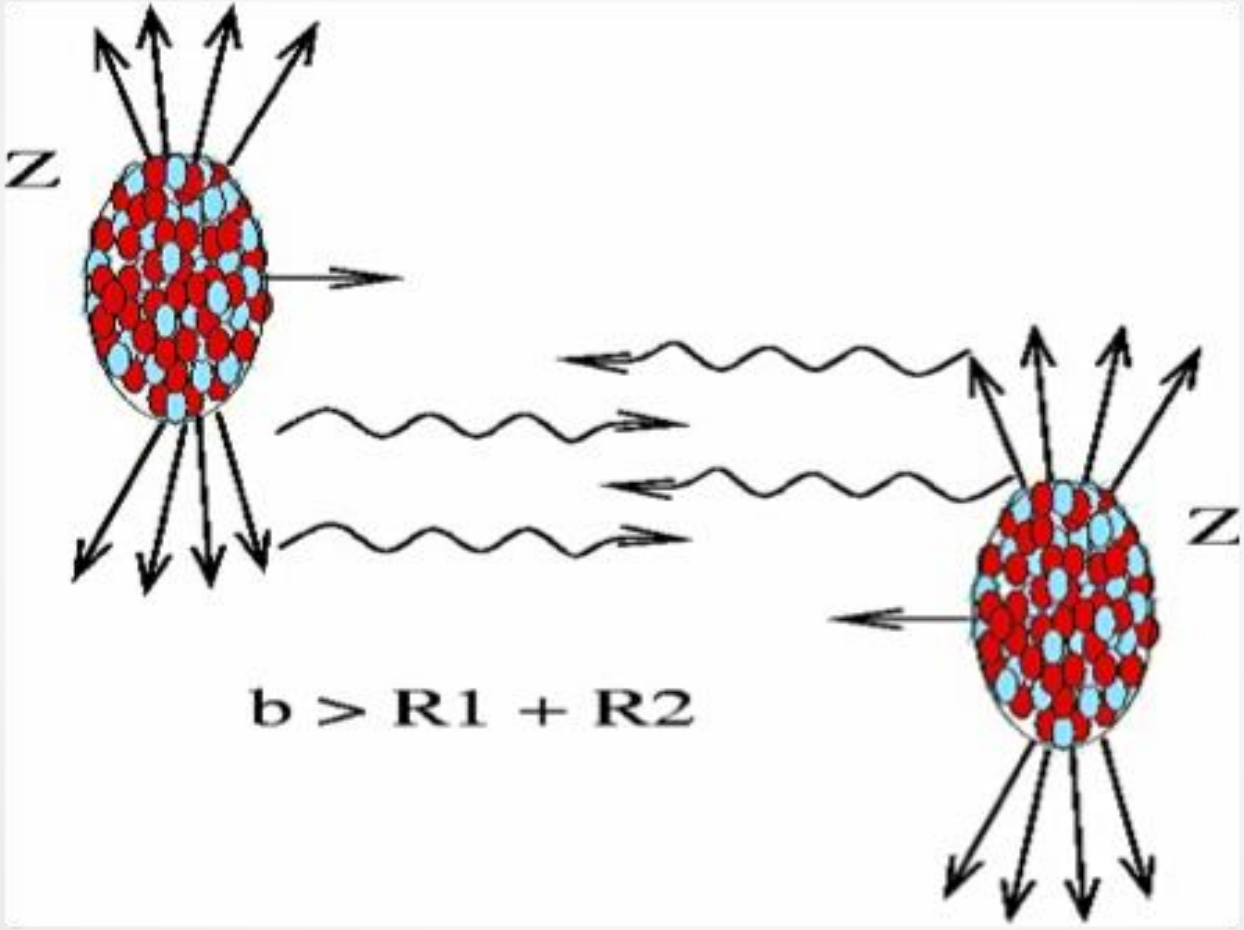
Hadronové (centrální)



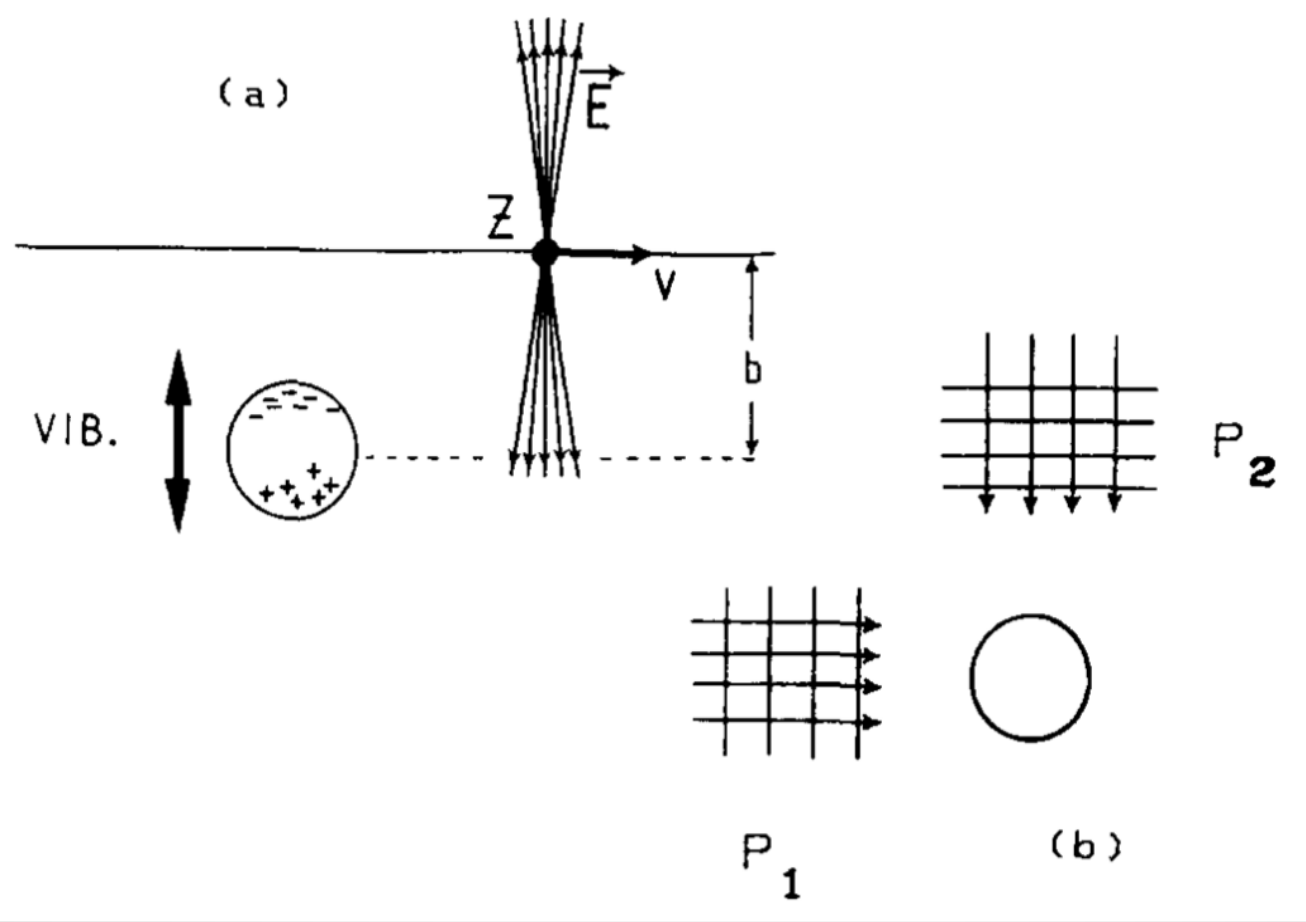
Periferální



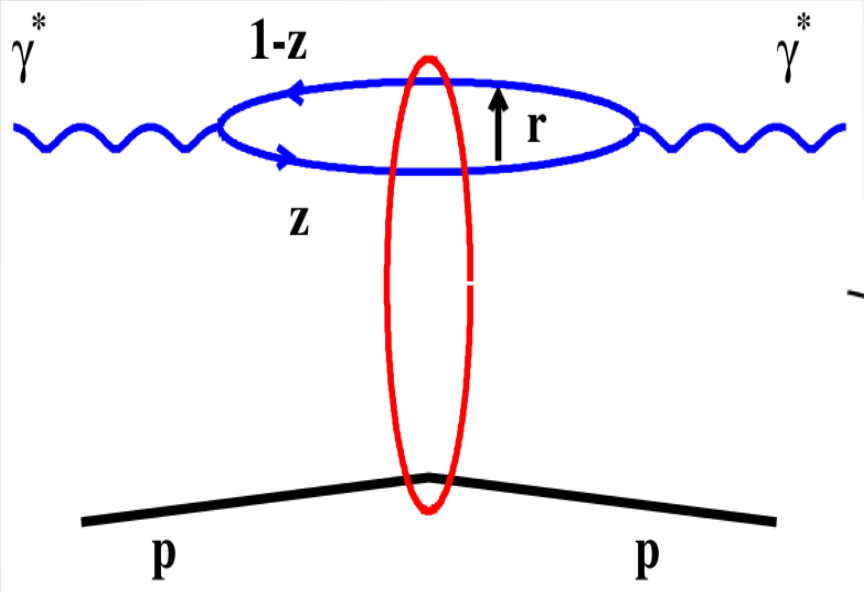
Ultra-preriferální

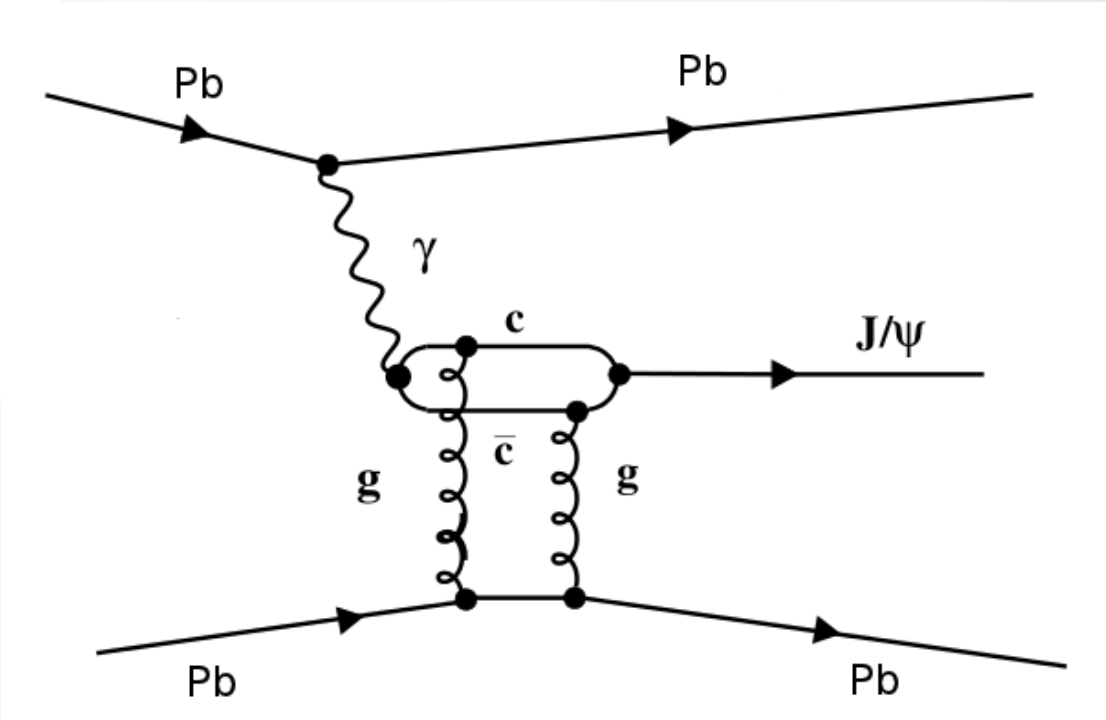


Zhuštění fotonů

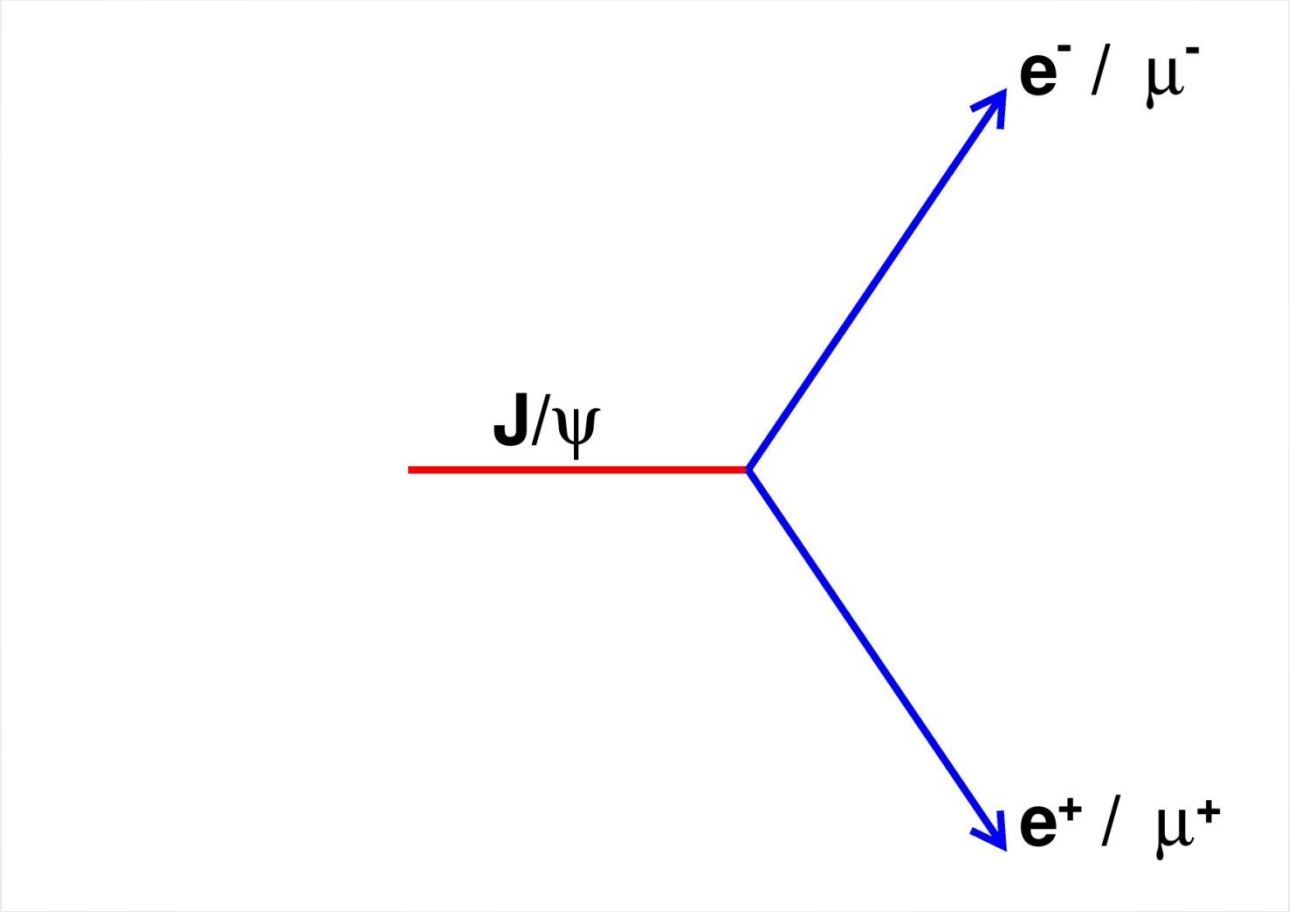


Vznik

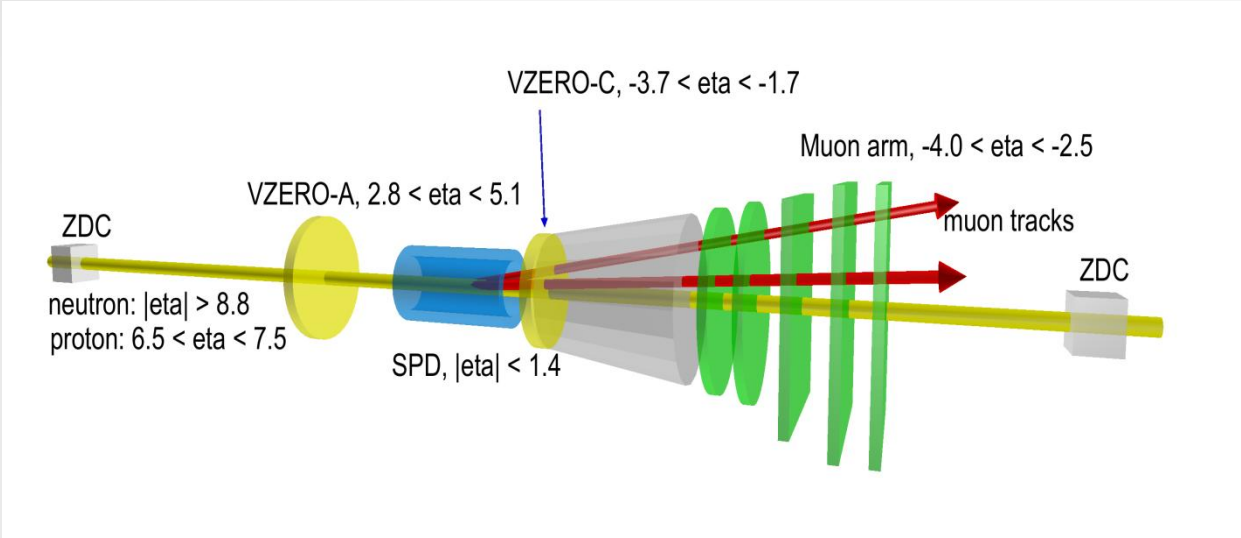


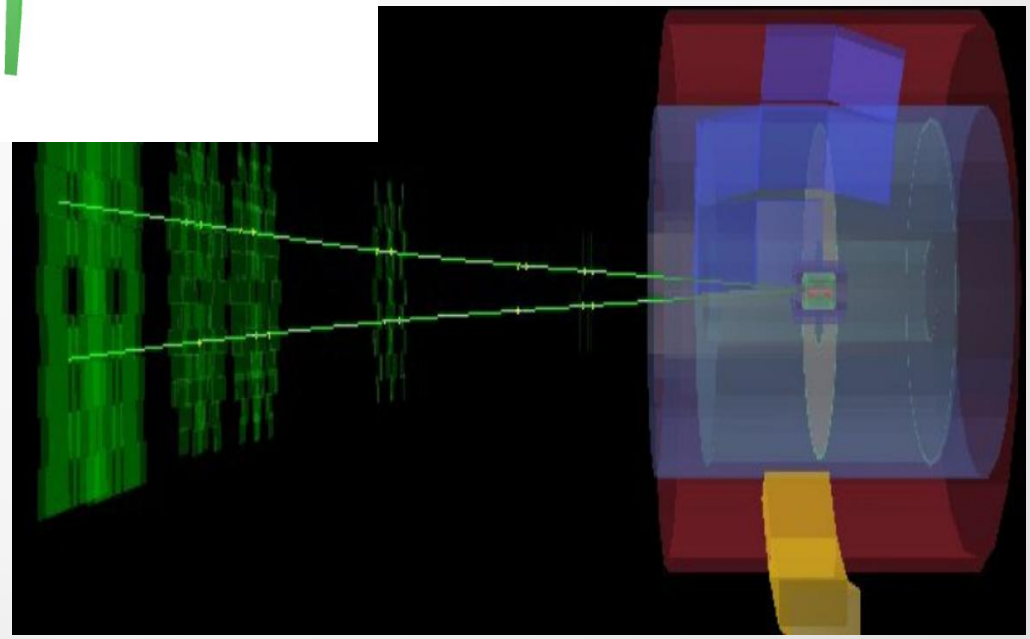


Rozpad

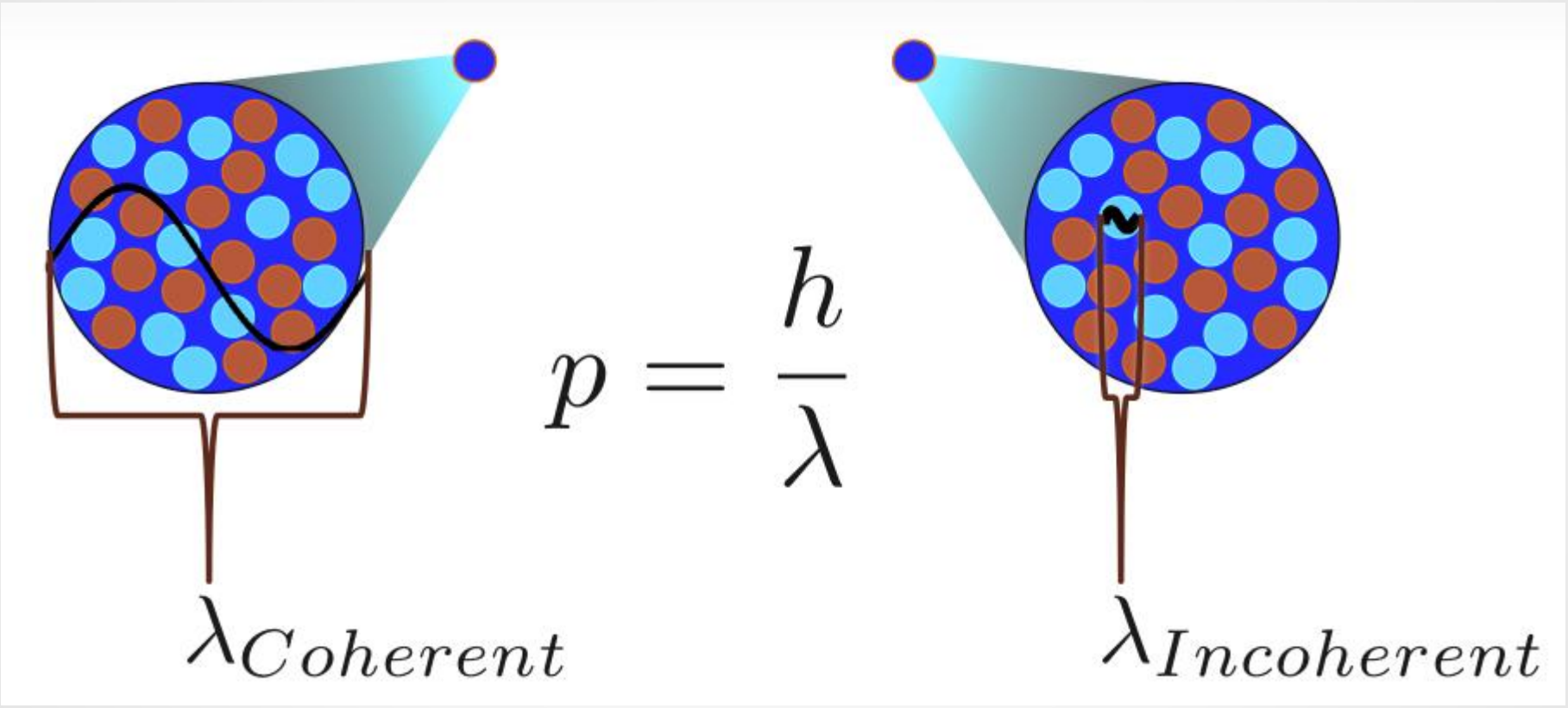


Detekce


VZERO-C, -3.7 < eta < -1.7
Muon arm, -4.0 < eta < -2.5
VZERO-A, 2.8 < eta < 5.1
muon tracks
ZDC
ZDC
neutron: |eta| > 8.8
proton: 6.5 < eta < 7.5
SPD, |eta| < 1.4



Způsob interakce



Filtrace dat srážek

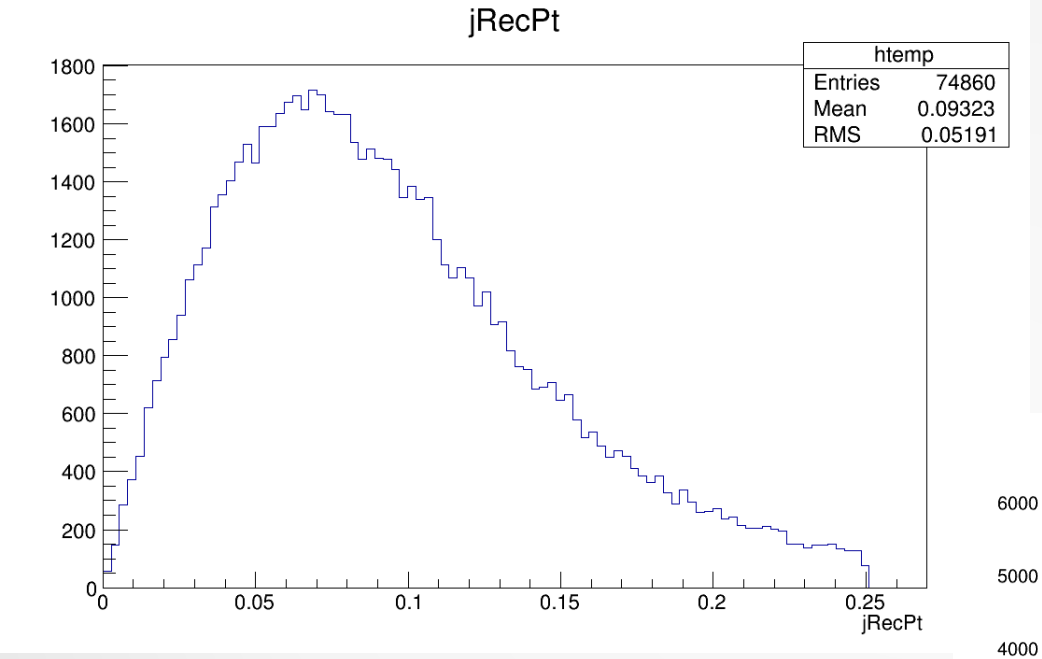
```
69
70 //_____________________________________________________________________________
71 void AnalysisForward( const char *infile=
72       //"trees/psi25FW11abc/AliUPC_psi25FW11c_esd_run0.root",
73       //"trees/mc/run0/AliUPC_lhc13c2_esd_run0.root",
74       //"trees/aod_train0/AnalysisResults_lhc12a8b.root",
75       "trees/aod_train0/AnalysisResults_lhc11h.root",
76
77       const char *outfilnam="Ucin.root") {
78
79   if( strcmp(infile,"") == 0 ) {cout<<"AnalysisForward: no input, exiting"<<endl; return;}
80   //analysis configuration
81   isTrain     = kTRUE;
82   maxspd      = -1; // maximal number of SPD tracklets, -1 = off
83   v0a         = -9;       v0c         = -9; // V2ERO decision, A and C,
84                                             // -9 = off, -1 = invalid, 0 = empty, 1 = beam-beam, 2 = beam-gas, 3 = fake
85   etaML       = -999.;    etaMH       = 999.; // pseudorapidity of muon tracks
86   minRabs     = 17.5;     maxRabs     = 89.5; // radial position at the end of the absorber
87   pdca        = kFALSE; //momentum dependent dca of track
88   minRap      = -999.;     maxRap      = 999.; // rapidity of dimuon
89   minPt       = 0.;       maxPt       = 999.; // transversal momentum of dimuon
90   minMass     = 0.;      maxMass     = 999.; // mass of dimuon
91
92   //input
93   TFile *f = TFile::Open(infile, "READ");
94   TTree *upcTree = 0x0;
95   if( isTrain ) {
96     upcTree = (TTree*) ((TDirectoryFile*) f->Get("UpcFilter"))->FindObjectAny("fUPCTree");
97   } else {
98     upcTree = (TTree*) f->Get("fUPCTree");
99   }
00   upcTree->SetBranchAddress("fUPCEvent", &upcEvt);
01
02   upcTree->GetEntry(0);
03   isMC = upcEvt->GetIsMC();
04   isESD = upcEvt->GetIsESD();
05
```

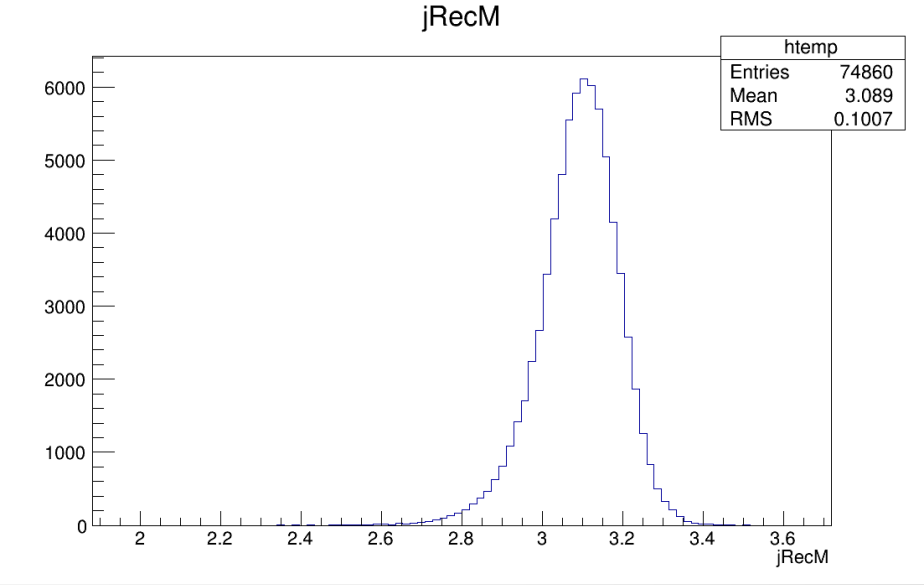
Vyhledávání v datech

```
adamjaro@Holly:~/analyza/upclib/tyden_vedy$ root -l -b -q RunAnalysisForward.C
root [0]
Processing RunAnalysisForward.C...
Starting analysis, events: 1780702, AOD
Input:   trees/aod_train0/AnalysisResults_lhc11h.root
Output:  Ucin.root
[==================>.........] 66.7 %
```

```
adamjaro@Holly:~/analyza/upclib/tyden_vedy$ root -l -b -q RunAnalysisForward.C
root [0]
Processing RunAnalysisForward.C...
Starting analysis, events: 1780702, AOD
Input:   trees/aod_train0/AnalysisResults_lhc11h.root
Output:  Ucin.root
[============================>] 100.0 %
Events analysed: 1780702
Selected:        85753
Analysis completed.
adamjaro@Holly:~/analyza/upclib/tyden_vedy$
```

Výsledky simulací



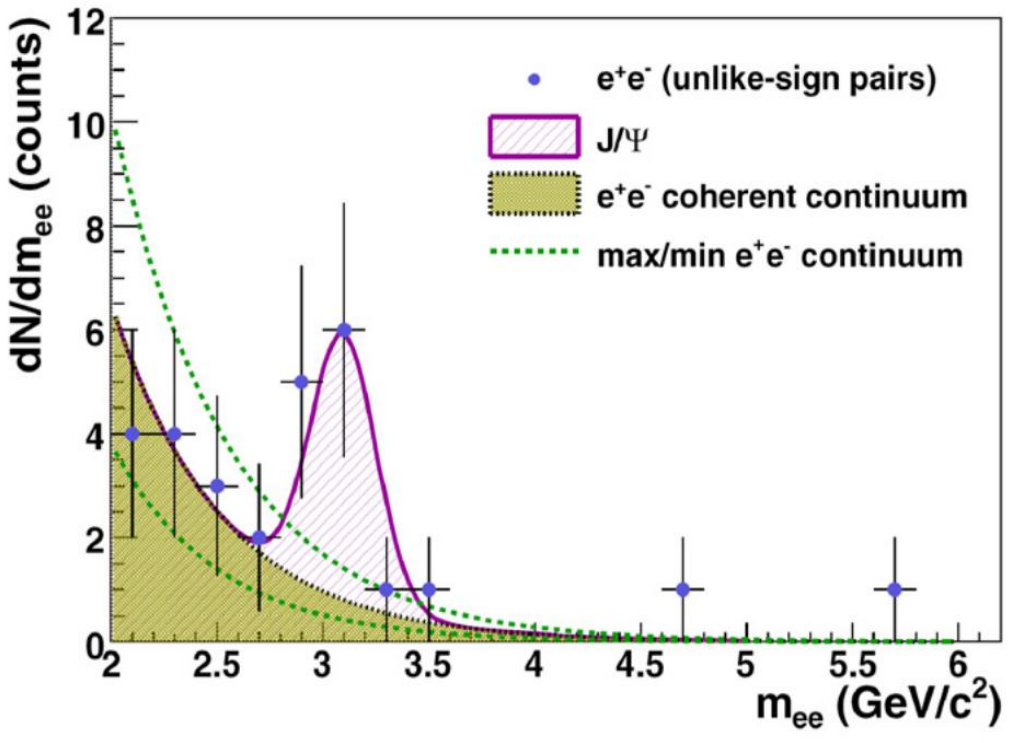


Modifikace nastavení selekce dat

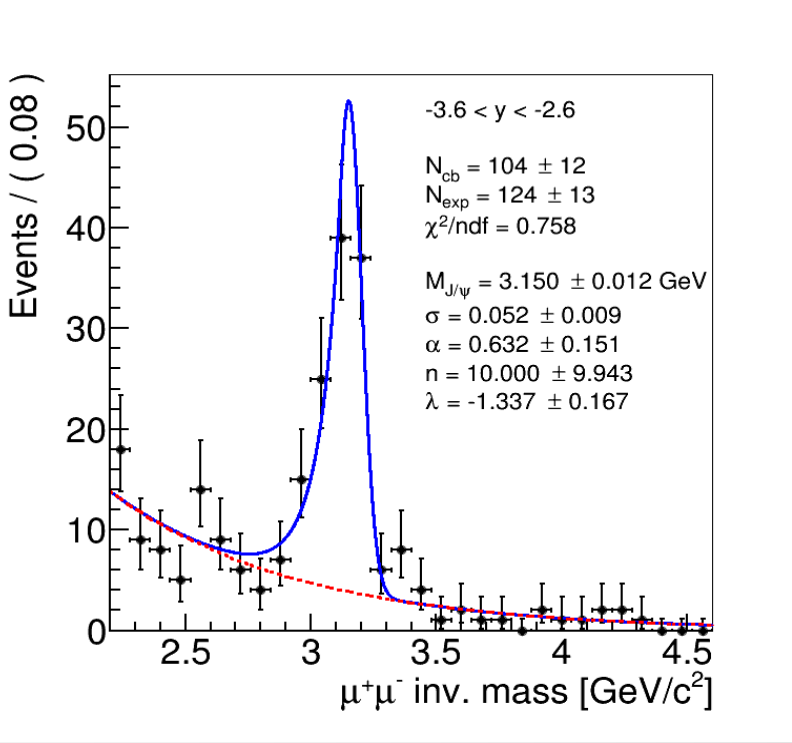
```
void AnalysisForward( const char *infile=
      //"trees/psi2SFW11abc/AliUPC_psi2SFW11c_esd_run0.root",
      //"trees/mc/run0/AliUPC_lhc13c2_esd_run0.root",
      "trees/aod_train0/AnalysisResults_lhc12a8b.root",
      //"trees/aod_train0/AnalysisResults_lhc11h.root",

      const char *outfilnam="FinalData.root") {

  if( strcmp(infile,"") == 0 ) {cout<<"AnalysisForward: no input, exiting"<<endl; retu

  //analysis configuration
  isTrain      = kTRUE;
  maxspd       = 2; // maximal number of SPD tracklets, -1 = off
  v0a          = 0;        v0c          = 1; // VZERO decision, A and C,
                                             // -9 = off, -1 = invalid, 0 = empty, 1 =
  etaML        = -3.7;     etaMH        = -2.5; // pseudorapidity of muon tracks
  minRabs      = 17.5;      maxRabs      = 89.5; // radial position at the end of the abs
  pdca         = kTRUE; //momentum dependent dca of track
  minRap       = -3.6;     maxRap       = -2.6; // rapidity of dimuon
  minPt        = 0.;        maxPt        = 0.25; // Stransversal momentum of dimuon
  minMass      = 2;        maxMass      = 5; // massSS of dimuon

  //input
  TFile *f = TFile::Open(infile, "READ");
  TTree *upcTree = 0x0;
  if( isTrain ) {
    upcTree = (TTree*) ((TDirectoryFile*) f->Get("UpcFilter"))->FindObjectAny("fUPCTre
  } else {
    upcTree = (TTree*) f->Get("fUPCTree");
```

Porovnání výsledků

Předchozí měření



Náš výsledek



Výsledky

Experimentální účinný průřez

$$\frac{\mathrm{d}\sigma}{\mathrm{d}y} = \frac{N^{coh}_{J/\psi}}{\varepsilon * \varepsilon_{trig} * \mathcal{B} * \mathcal{L} * \Delta y}$$

1,2 ± 0,1 mb

Teoretický účinný průřez

$$\frac{d\sigma_{theo}}{dy} = \frac{\sigma_{tot} * R_y}{\Delta y}$$

1,8 mb

Závěr

Dokázání existence gluonového stínění

Seznámení se zpracování dat z LHC

První kontakt s fyzikou mikrosvěta

Poděkování

Jaroslavu Adamovi za vedení miniprojektu

Týdnu vědy za organizaci

FJFI za poskytnutí zázemí

Vám za Vaši pozornost