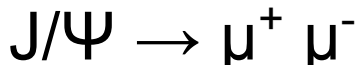


Belle II international masterclasses

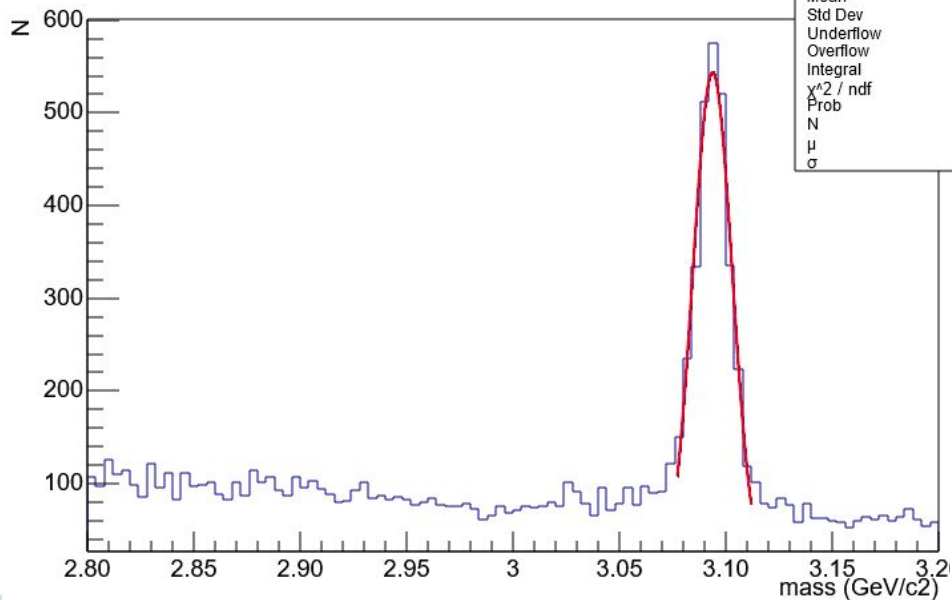
IPHC Strasbourg

7 March 2022





J/Psi mson Mass



Range: min = 3.0772 max = 3.112 $\chi^2/\text{ndf} = 17.57 / 6 = 2.928$ || $N_{\text{signal}} = 3134$

Function: Gaus $N \cdot e^{-\frac{x-\mu}{\sigma}}^2$

Name	Value	Min	Set	Max	Step
• μ :	3.0938	2.8		3.2	0.0001
• σ :	0.0092	0		0.0800000000	0.0001
• N:	543.7224	0		1150	0.0001

Belle II Masterclass

Number of events: 10000000

First event: 0

Data Source: BelleII.root

Print particle list? No

Particle List

Combine 2 particles

Particle 1: Select Particles Simple
Particle
Charge 1
Type muon
Histograms

Particle 2: Select Particles Simple
Particle
Charge -1
Type muon
Histograms

Same particle lists? No

Set identity to J/Psi meson

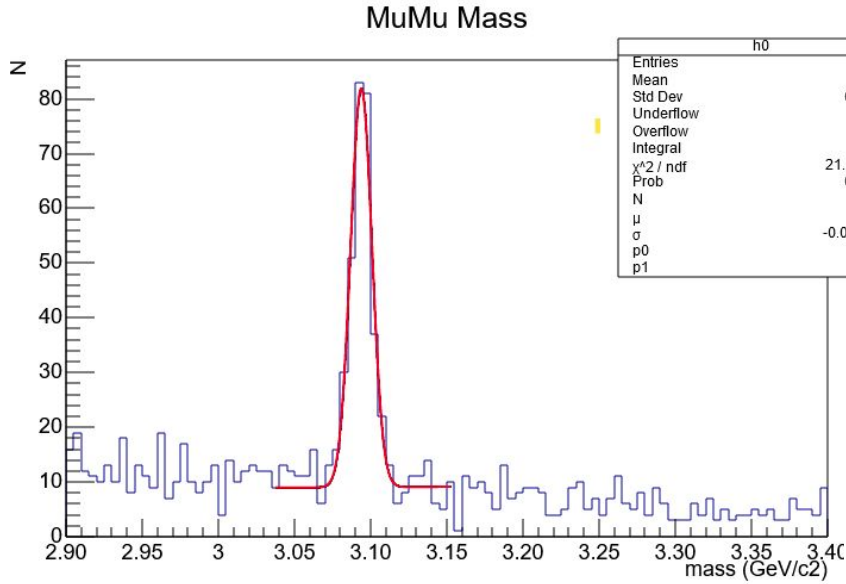
Min mass [GeV/c²]: 0

Max mass [GeV/c²]: 3.2

Histograms

Histogram Title J/Psi meson Mass Number of bins 100 Min: 2.8000000000000003 Max: 3.2 Variable mass

J/ψ → μ⁺ μ⁻ fit: Gauss + Polynomial



Belle II Masterclass
 Number of events: 1000000
 First event: 0
 Data Source: BelleII.root
 Print particle list?: No
 Particle List

Combine 2 particles

Particle 1
 Select Particles Simple
 Particle
 Charge -1
 Type muon
 Histograms

Particle 2
 Select Particles Simple
 Particle
 Charge 1
 Type muon
 Histograms

Same particle lists? No
 Set identity to J/Psi meson
 Min mass [GeV/c²]: 2
 Max mass [GeV/c²]: 4
 Histograms

Histogram Title MuMu Mass Number of bins 100 Min: 2.9000000000000004 Max: 3.4000000000000004 Variable mass

Click to fit

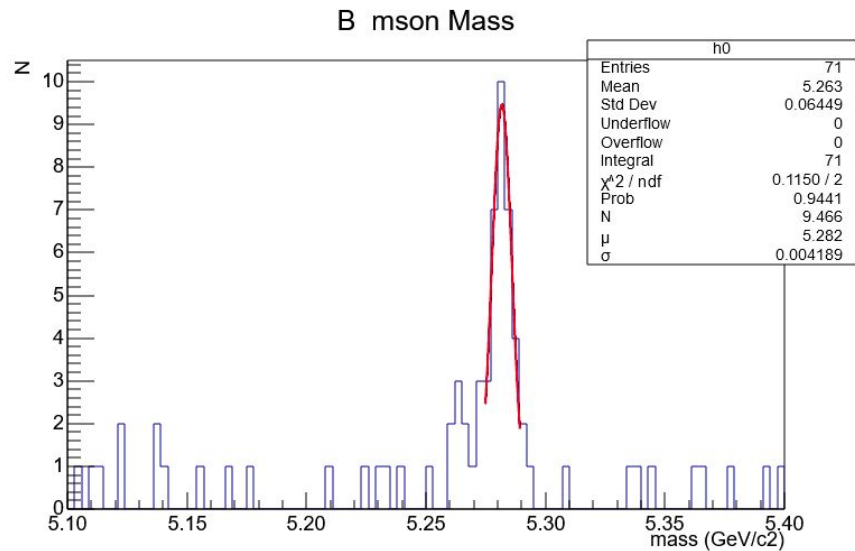
Range: min = 3.0375 max = 3.1525 χ²/ndf = 21.11 / 17 = 1.242 || N_{signal} = -254 || N_{background} = 217

Function: Gaus + Polynomial $N \cdot e^{-\left(\frac{x-\mu}{4\sigma}\right)^2} + p0 + p1 \cdot x$

Name	Value	Min	Set	Max	Step
• μ:	3.0939	2.9	<input type="range"/>	3.4	0.0001
• σ:	-0.00696	-0.01165509	<input type="range"/>	16.35833585	0.0001
• N:	72.8549	0	<input type="range"/>	166	0.0001

Polynomial order:

Name	Value	Min	Set	Max	Step
• p0:	4.5637	-10	<input type="range"/>	10	0.0001
• p1:	1.4486	-10	<input type="range"/>	10	0.0001



Range: min = 5.2749 max = 5.2893 $\chi^2/\text{ndf} = 0.1164 / 2 = 0.05820$ || $N_{\text{signal}} = 33$

Function: **Gaus** $N \cdot e^{-\frac{(x-\mu)^2}{2\sigma^2}}$

Name	Value	Min	Set	Max	Step
• μ :	5.2818	5.1		5.4	0.0001
• σ :	0.0042	0		0.0600000000	0.0001
• N:	9.4664	0		20	0.0001

Belle II Masterclass

Number of events: 10000000

First event: 0

Data Source: BelleII.root

Print particle list? No

Particle List

Combine 2 particles

Particle 1: Select Particles Simple
Particle: kaon
Charge: 1
Type: kaon

Particle 2: Combine 2 particles

Particle 1: Select Particles Simple
Particle: muon
Charge: 1
Type: muon

Particle 2: Select Particles Simple
Particle: muon
Charge: -1
Type: muon

Same particle lists? No

Set identity to: B meson

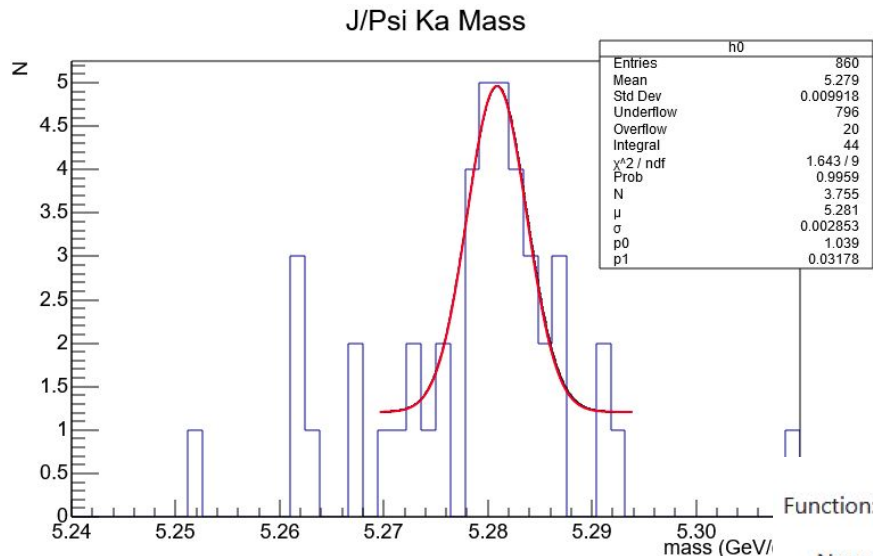
Min mass [GeV/c²]: 5.1000000000000005

Max mass [GeV/c²]: 5.4

Histograms

Histogram Title: B+ meson Mass Number of bins: 100 Min: 5.1000000000000005 Max: 5.4 Variable: mass

$B^+ \rightarrow J/\Psi K^+$ fit: Gauss + Polynomial

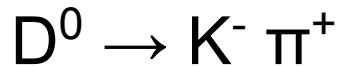


Function: Gaus + Polynomial $N \cdot e^{-\left(\frac{x-\mu}{4\sigma}\right)^2} + p0 + p1 \cdot x$

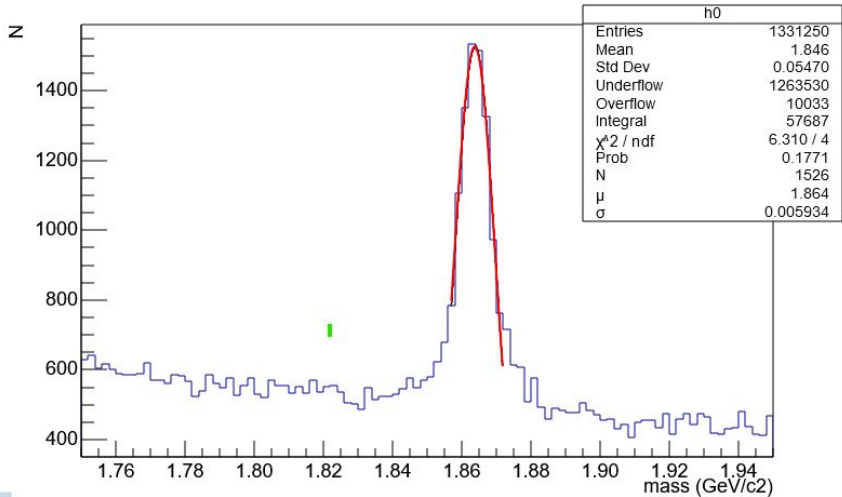
Name	Value	Min	Set	Max	Step
• μ :	5.2809	5.24	<input type="range"/>	5.31	0.0001
• σ :	0.0029	0	<input type="range"/>	0.013999999!	0.0001
• N:	3.7552	0	<input type="range"/>	10	0.0001

Polynomial order:

Name	Value	Min	Set	Max	Step
• p0:	1.0392	-10	<input type="range"/>	10	0.0001
• p1:	0.0318	-10	<input type="range"/>	10	0.0001



Kpi mass



Click to fit

Range: min = 1.857 max = 1.8718 $\chi^2/\text{ndf} = 6.406 / 4 = 1.601$ || $N_{\text{signal}} = 11287$

Function: **Gaus** $N \cdot e^{-\frac{(x-\mu)^2}{2\sigma^2}}$

Name	Value	Min	Set	Max	Step
• μ :	1.8638	1.75	<input type="range"/>	1.95	0.0001
• σ :	0.0059	0	<input type="range"/>	0.03999999999	0.0001
• N:	1526.4773	0	<input type="range"/>	3066	0.0001

Belle II Masterclass

Number of events: 1000000

First event: 0

Data Source: BelleII.root

Print particle list? No

Particle List

Combine 2 particles

Particle 1: Select Particles Simple
 Particle:
 Charge: -1
 Type: kaon
 Histograms:

Particle 2: Select Particles Simple
 Particle:
 Charge: 1
 Type: pion
 Histograms:

Same particle lists? No

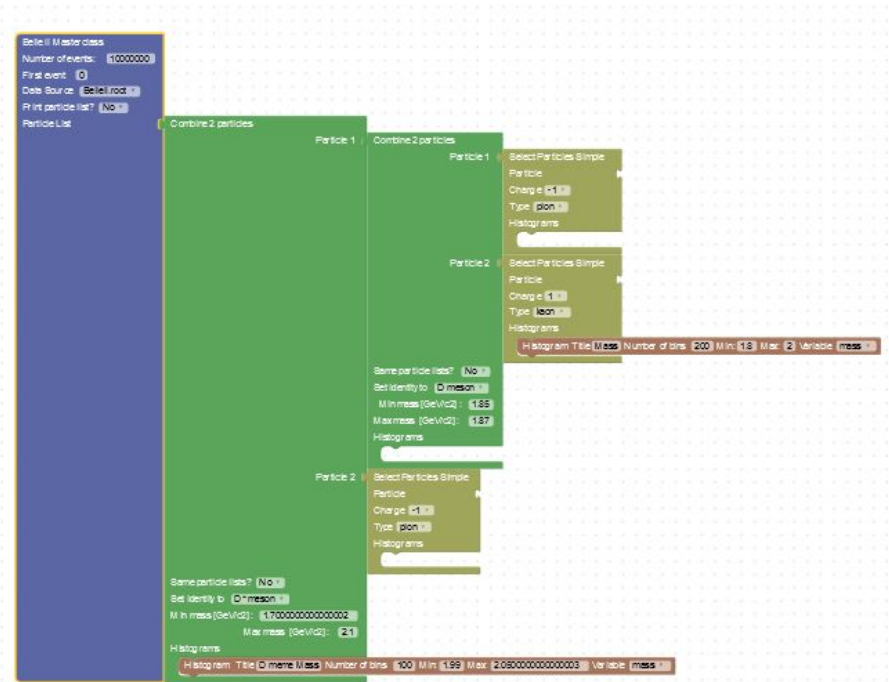
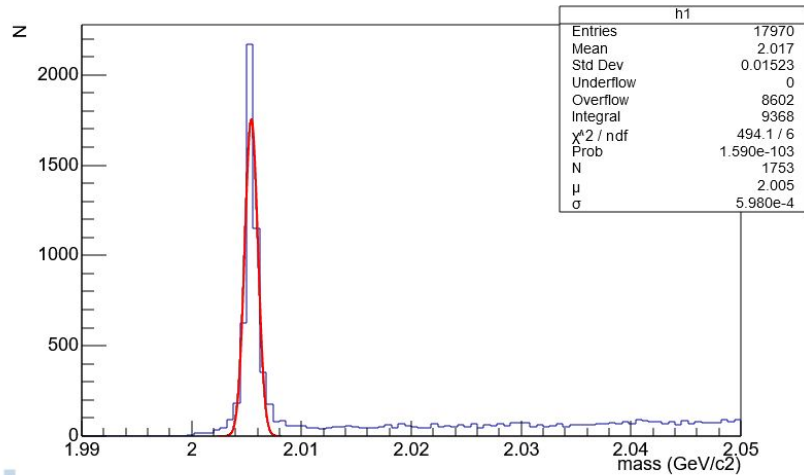
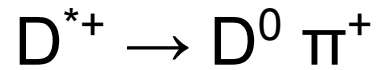
Set identity to: D meson

Min mass [GeV/c²]: 1

Max mass [GeV/c²]: 2

Histograms

Histogram Title: Mass Number of bins: 200 Min: 1.7000000000000002 Max: 2 Variable: mass



Click to fit

Range: min = 2.0024 max = 2.0081 $\chi^2/\text{ndf} = 520.8 / 6 = 86.80$ || $N_{\text{signal}} = 4394$

Function: **Gaus** $N \cdot e^{-\frac{(\mu - x)^2}{2\sigma^2}}$

Name	Value	Min	Set	Max	Step
• μ :	2.0054	1.99	<input type="text"/>	2.05	0.0001
• σ :	0.0006	0	<input type="text"/>	0.0119999999	0.0001
• N:	1753.2384	0	<input type="text"/>	4338	0.0001