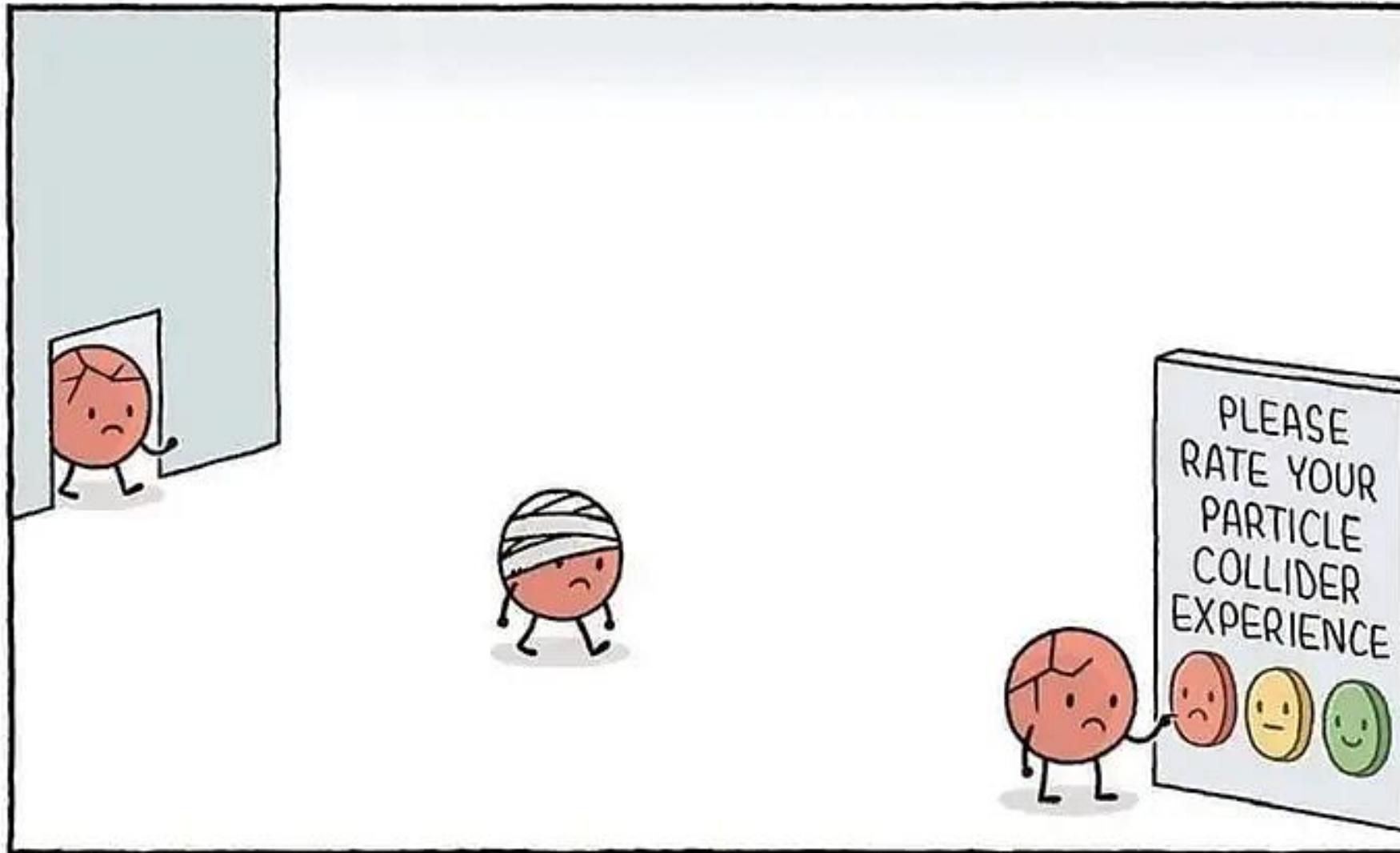


È ora di... compilare il questionario di gradimento!



TOM GAULD for NEW SCIENTIST

15:00

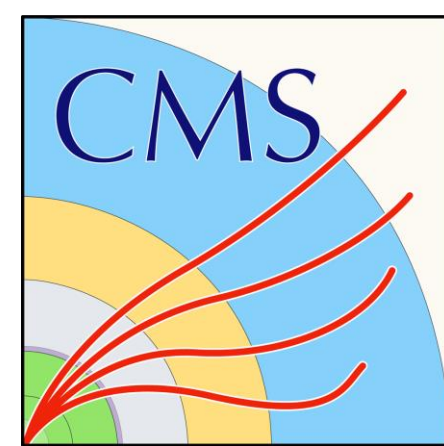
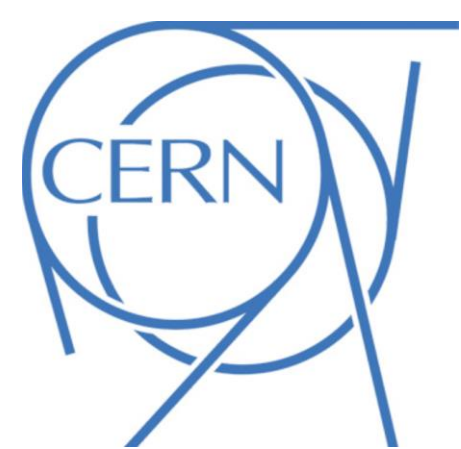
Discussione dei risultati

[Questionario di grad...](#)

Questionario di gradimento

15:30





Discussione dei Risultati

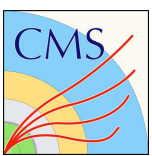
25/02/2025

A. Lapertosa

Uni
ct

FISICA E ASTRONOMIA
"ETTORE MAJORANA"

INFN
CATANIA



Risultati: numeri e frequenze

- Domande:
 - Quanti elettroni? Quanti muoni?
 - Rapporto tra elettroni/muoni: 0.98

Total:

Group	e	μ	W+	W-	W \pm	Neutral	Zoo	Total
All	774	788	308	244	340	570	143	1605

Risultati: numeri e frequenze

- Domande:

- Quanti elettroni? Quanti muoni?
 - Rapporto tra elettroni/muoni: 0.98
 - Previsione: 1 (Universalità leptonica)

- $W \rightarrow e \nu_e$
- $W \rightarrow \mu \nu_\mu$
- $W \rightarrow \tau \nu_\tau$
- $Z \rightarrow e e$
- $Z \rightarrow \mu \mu$
- $Z \rightarrow \tau \tau$
- $Z \rightarrow \nu_e \nu_e$
- $Z \rightarrow \nu_\mu \nu_\mu$
- $Z \rightarrow \nu_\tau \nu_\tau$

Leptoni

e elettrone	μ muone	τ tau
ν_e neutrino	ν_μ neutrino	ν_τ neutrino

Total:

Group	e	μ	W+	W-	W \pm	Neutral	Zoo	Total
All	774	788	308	244	340	570	143	1605



Risultati: numeri e frequenze

- Domande:
 - Quanti W^+ ? Quanti W^- ?
 - Rapporto tra W^+/W^- : 1.3

Total:

Group	e	μ	W+	W-	W^\pm	Neutral	Zoo	Total
All	774	788	308	244	340	570	143	1605

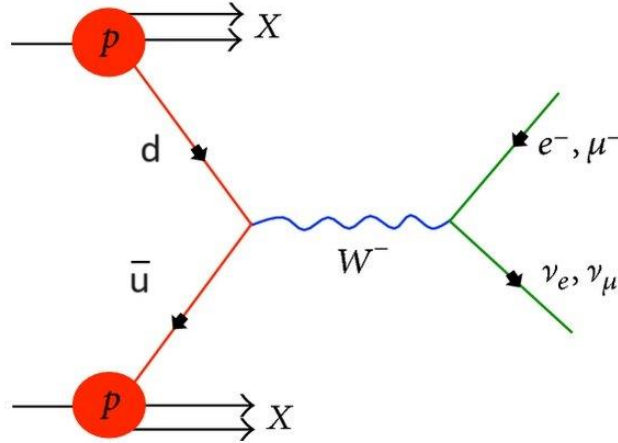
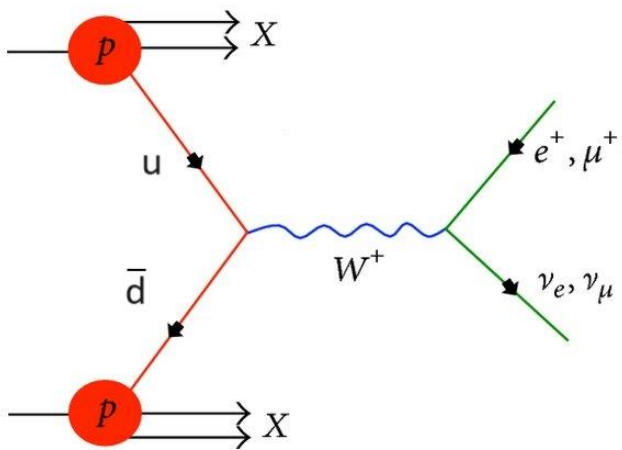
Risultati: numeri e frequenze

- Domande:

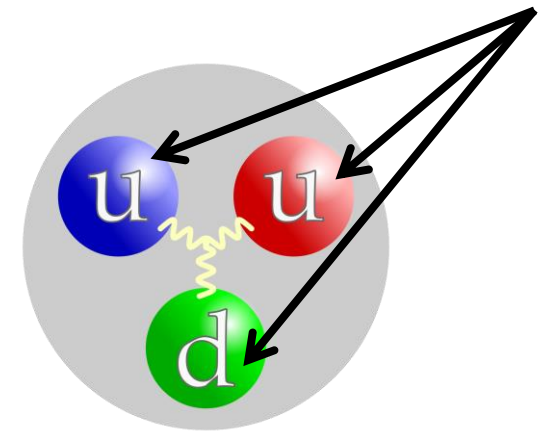
- Quanti W^+ ? Quanti W^- ?

- Rapporto tra W^+/W^- : 1.3

- Previsione: 1.4 (Rapporto quark up/down nel protone)



Protone Quark

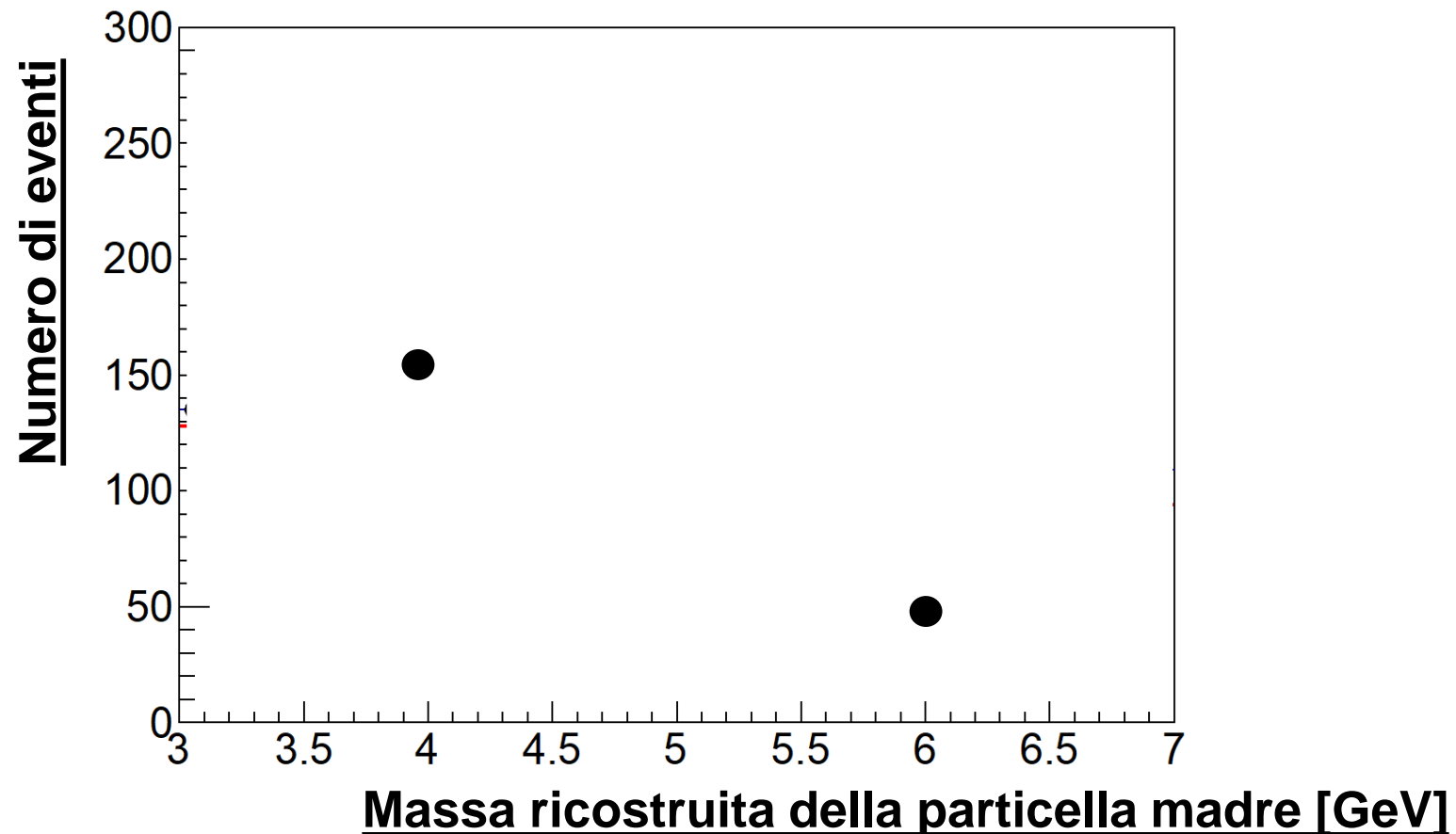


Total:

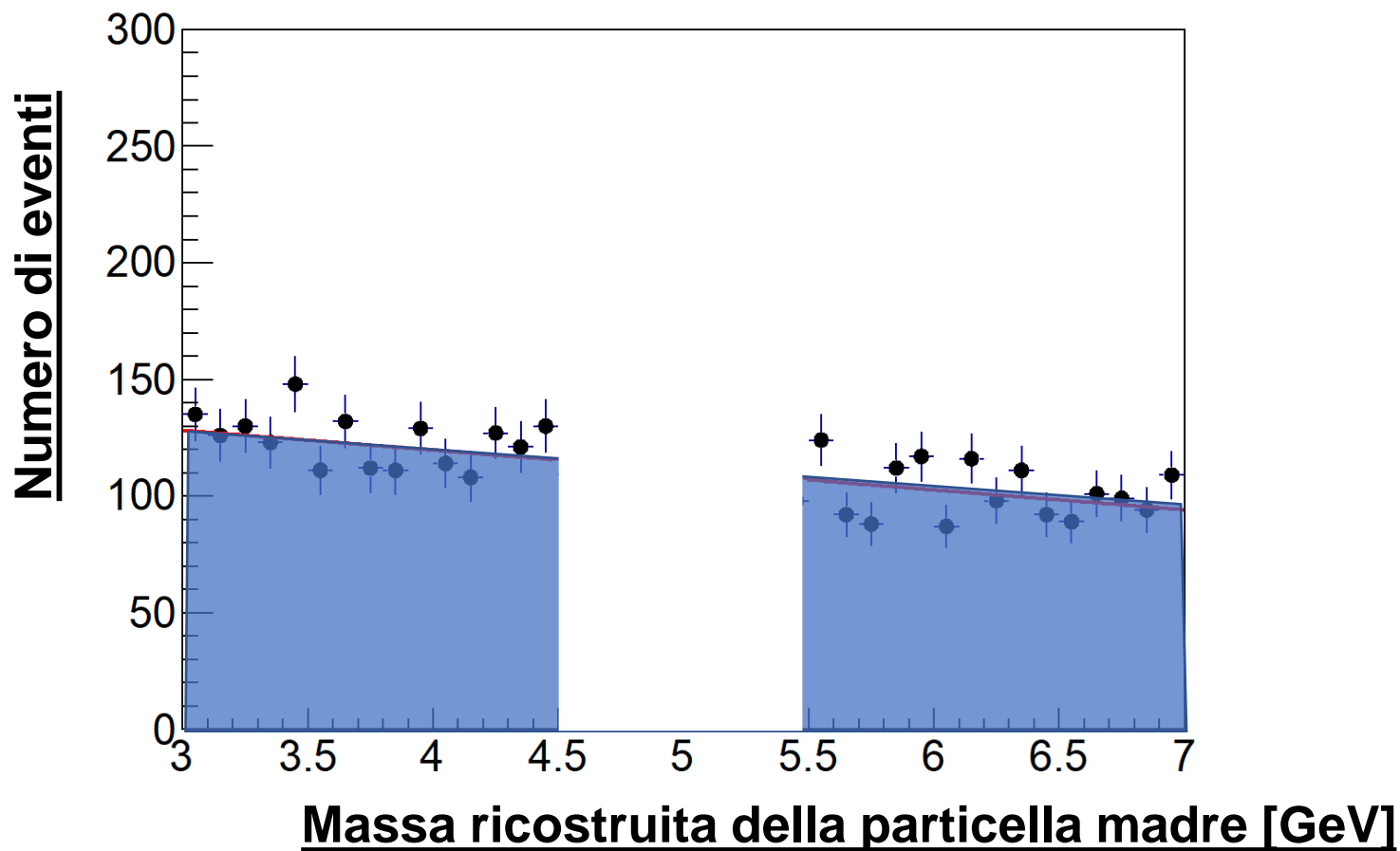
Group	e	μ	W^+	W^-	W^\pm	Neutral	Zoo	Total
All	774	788	308	244	340	570	143	1605

Istogramma di massa

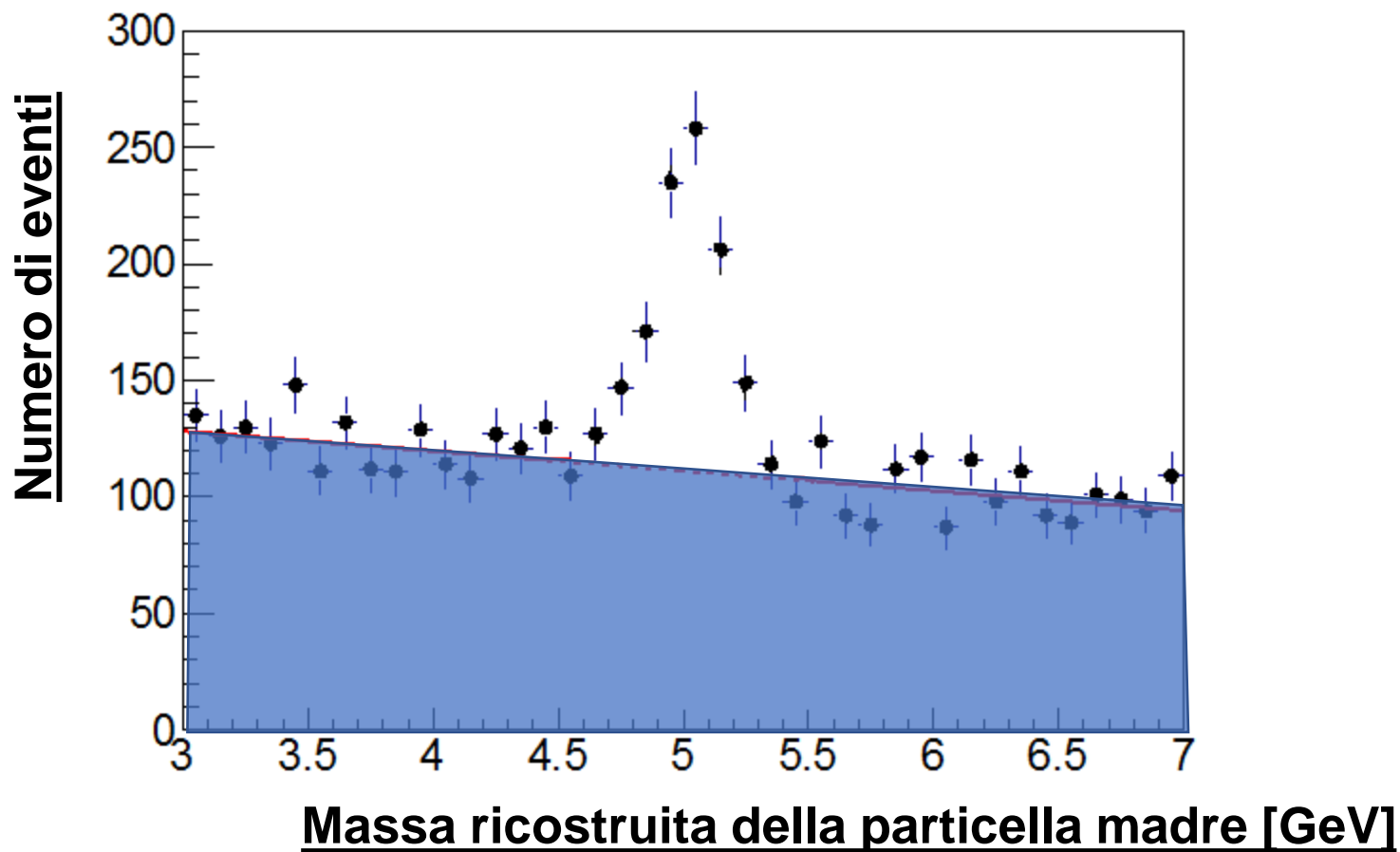
- Dopo aver identificato i segnali e classificato gli eventi
 - I dati vengono analizzati statisticamente
 - Le informazioni delle collisioni vengono sintetizzate in **istogrammi**



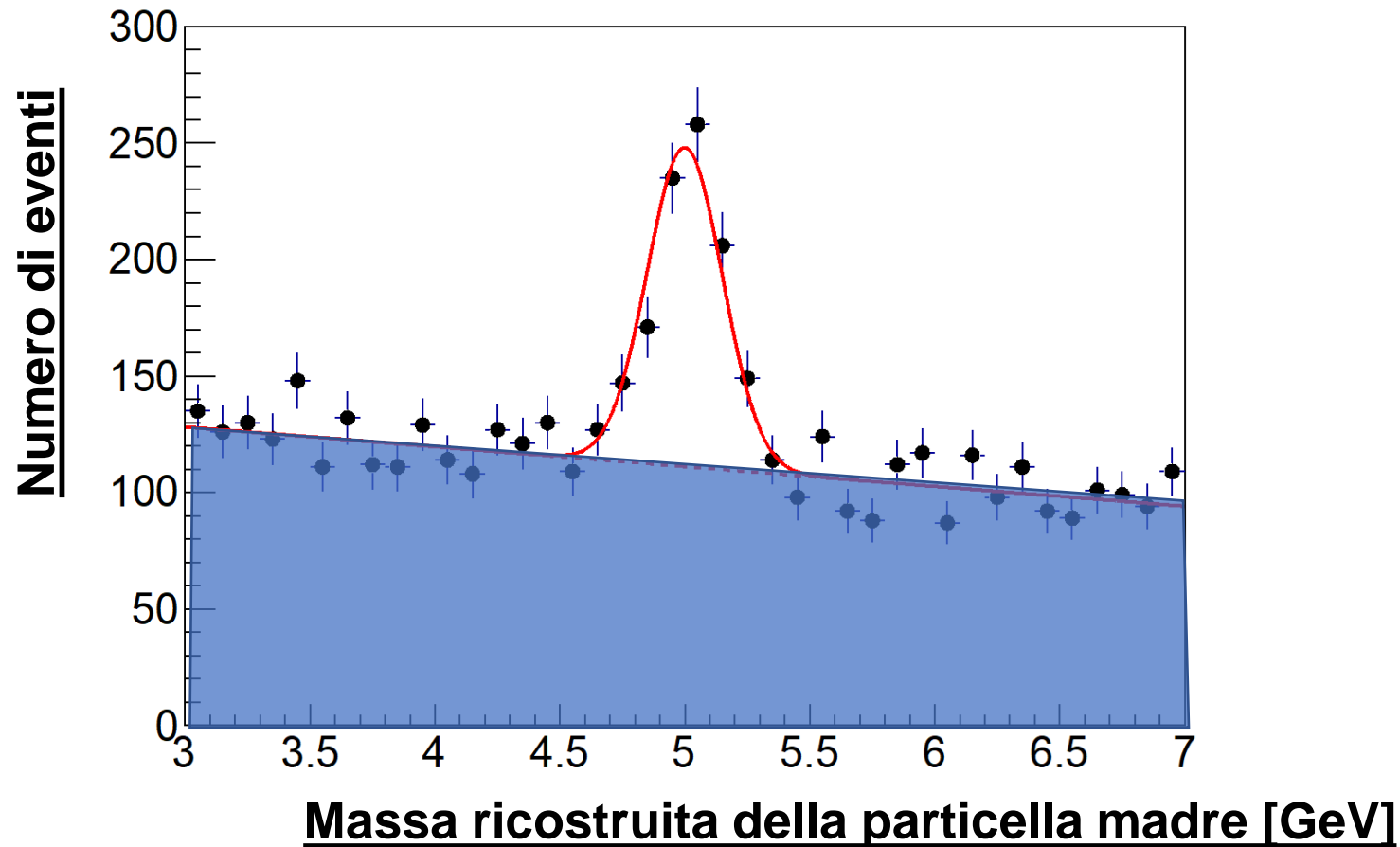
Eventi casuali distribuiti casualmente



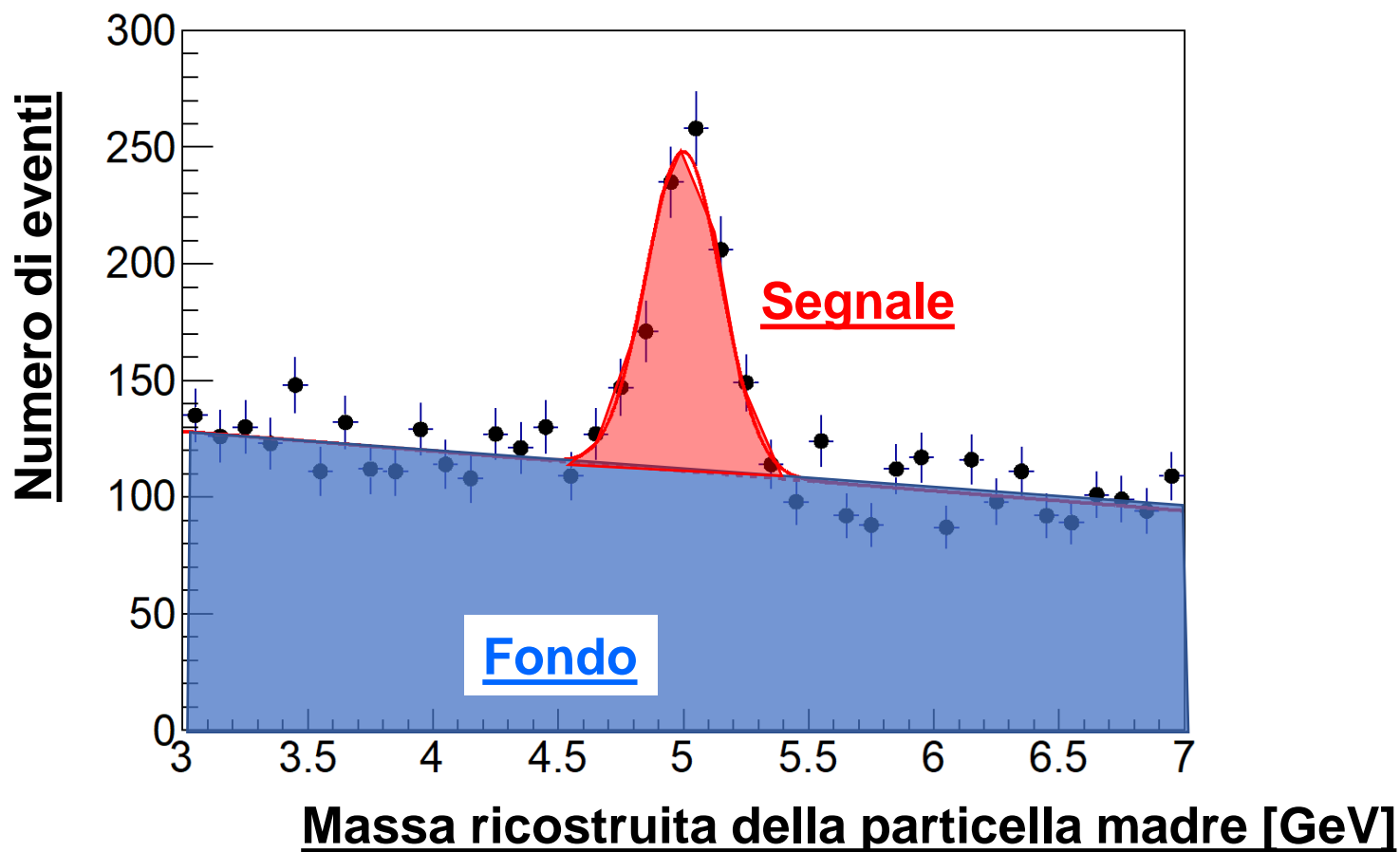
C'è qualcosa in più del previsto

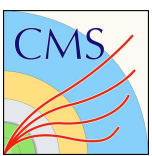


Scoperta di una particella!



Fondo + Segnale

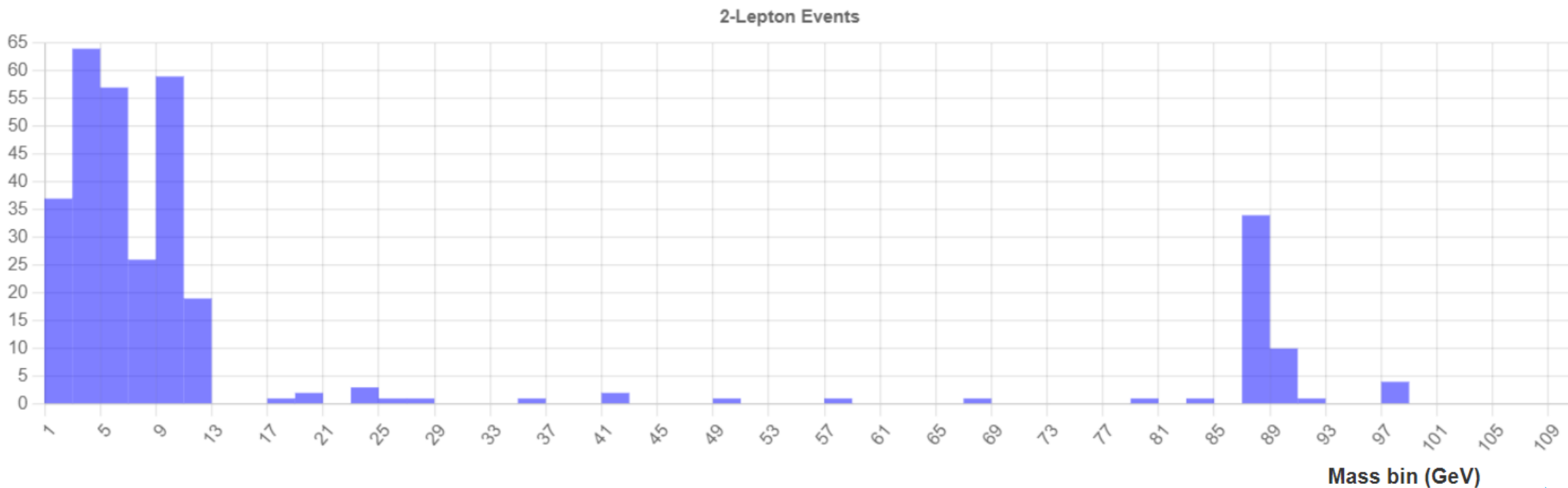




Risultati: istogramma di massa ($Z \rightarrow ee/\mu\mu$)

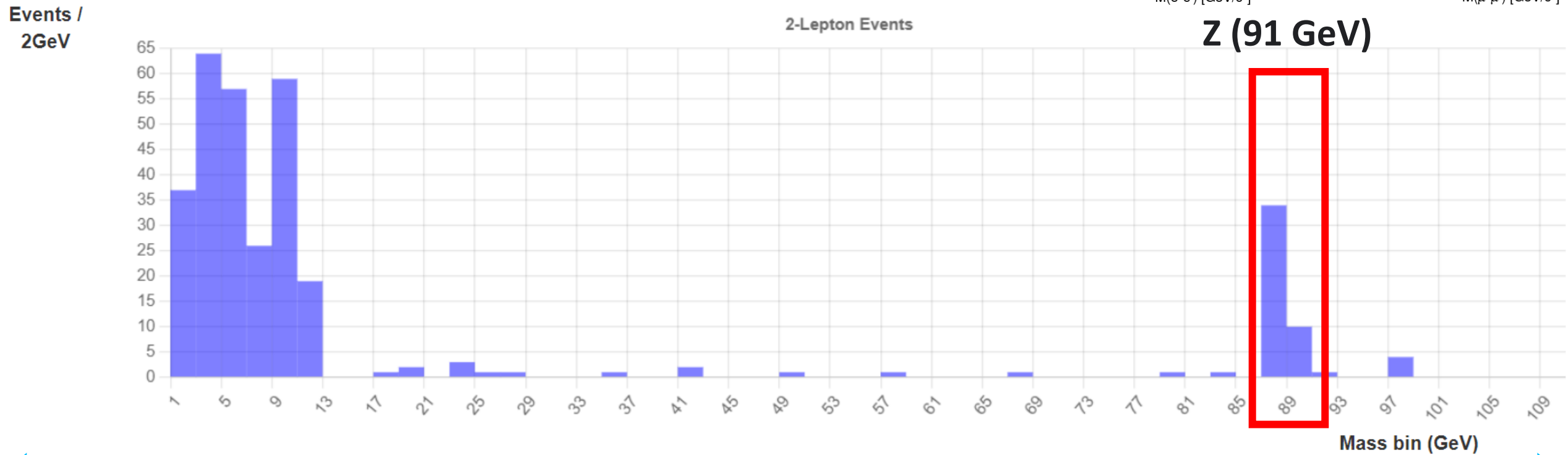
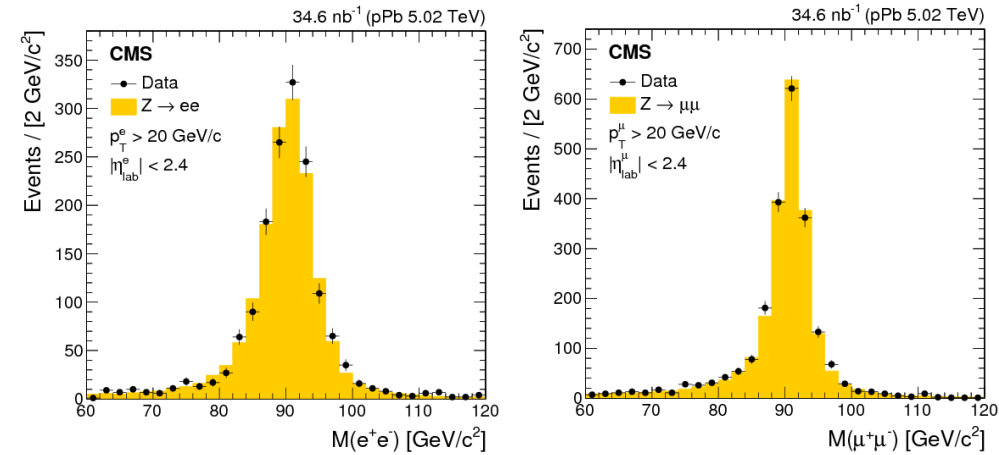
- Domande:
 - Cosa si vede?
 - C'è un picco?
 - Quale massa [GeV]?
 - A quale particella corrisponde?

Events /
2GeV



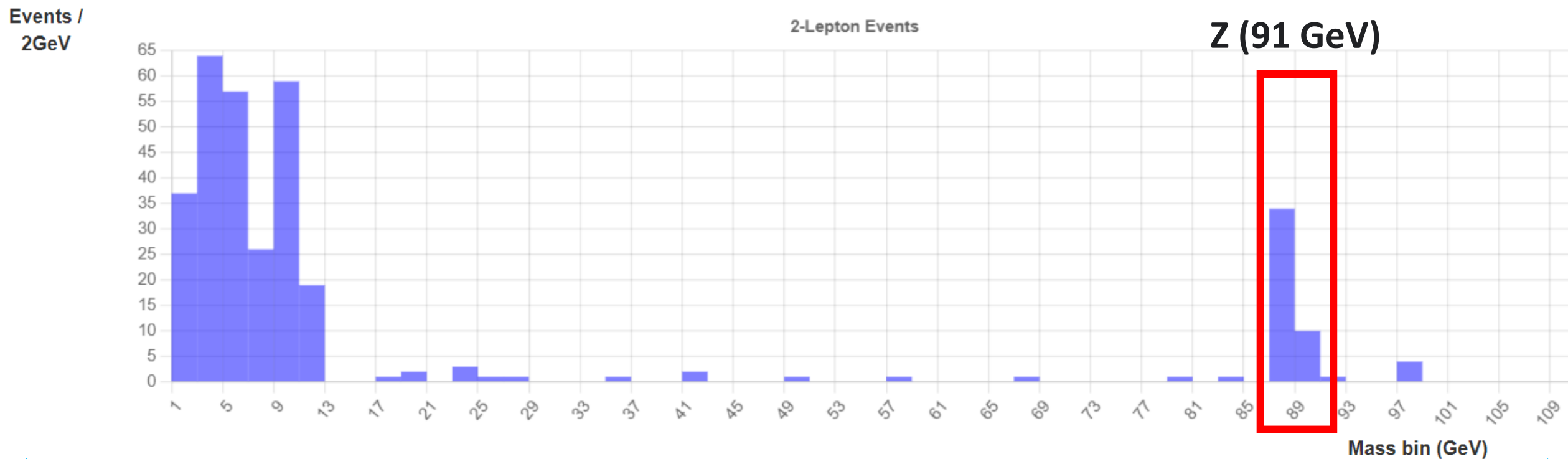
Risultati: istogramma di massa ($Z \rightarrow ee/\mu\mu$)

- Domande:
 - Cosa si vede?
 - C'è un picco?
 - Quale massa [GeV]?
 - A quale particella corrisponde?



Risultati: istogramma di massa ($Z \rightarrow ee/\mu\mu$)

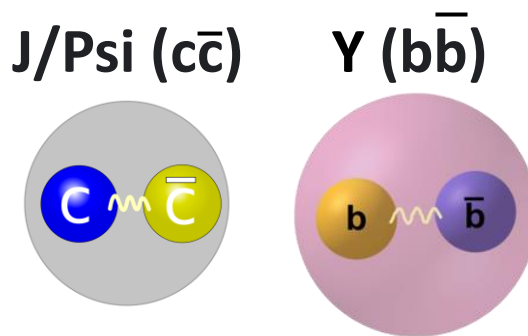
- Domande:
 - Cosa si vede?
 - C'è un picco?
 - Quale massa [GeV]?
 - A quale particella corrisponde?
 - Ci sono altri picchi?



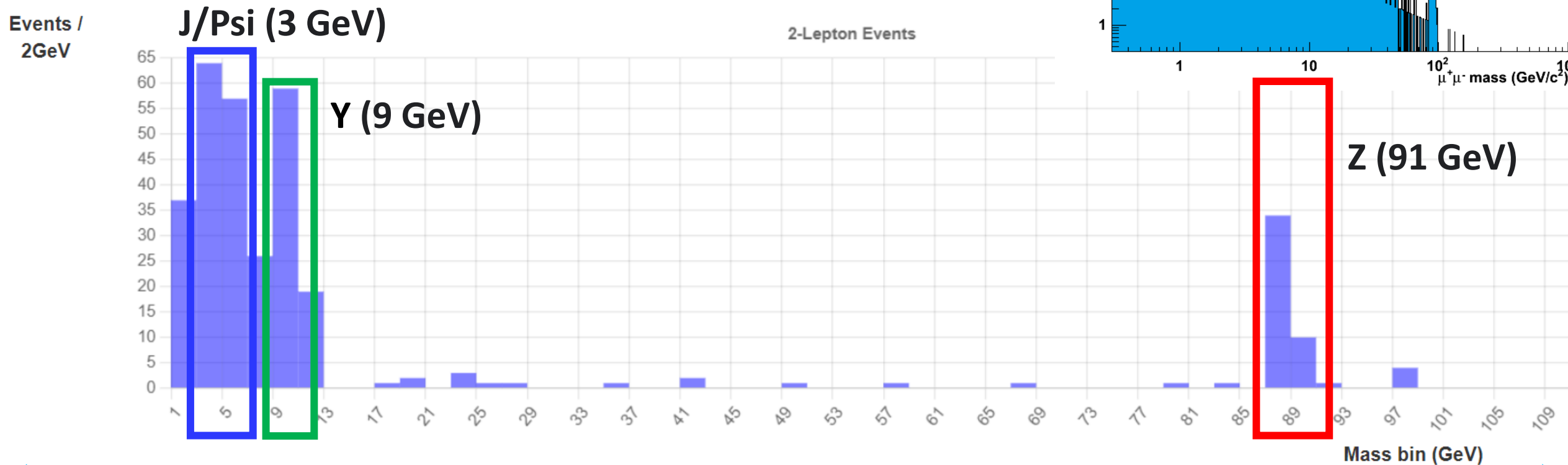
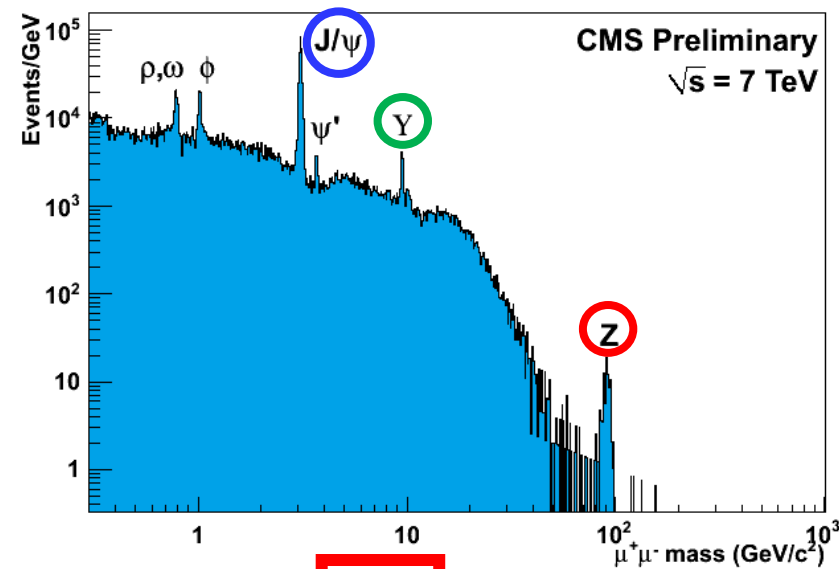
Risultati: istogramma di massa ($Z \rightarrow ee/\mu\mu$)

• Domande:

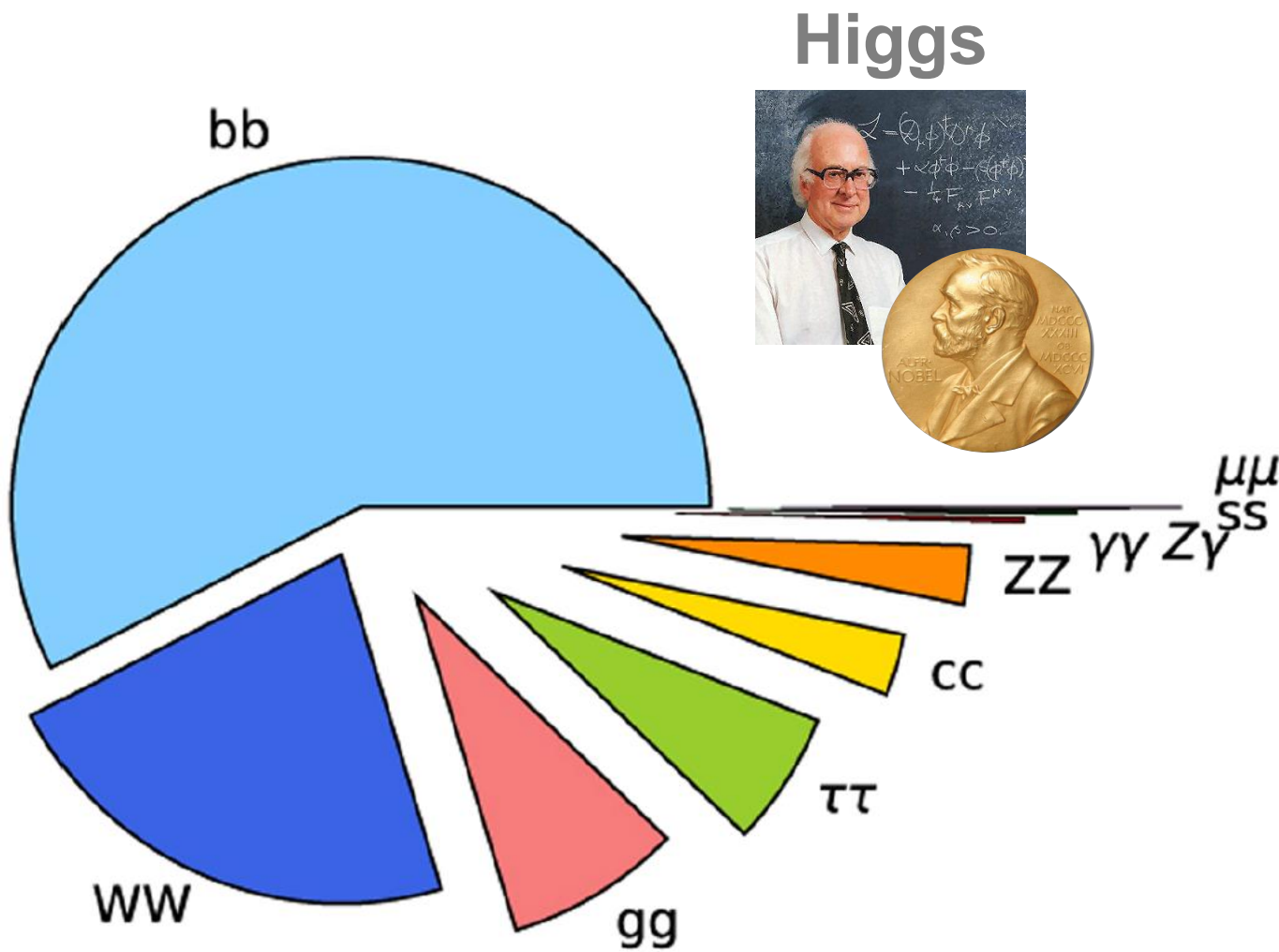
- Cosa si vede?
- C'è un picco?
 - Quale massa [GeV]?
 - A quale particella corrisponde?
- Ci sono altri picchi?



2-Lepton Events



Canali di Decadimento del Bosone di Higgs



Decadimento	Probabilità [%]
-------------	-----------------

$H \rightarrow b\bar{b}$ 57.5 ± 1.9

$H \rightarrow WW$ 21.6 ± 0.9

$H \rightarrow gg$ 8.56 ± 0.86

$H \rightarrow \tau\tau$ 6.30 ± 0.36

$H \rightarrow c\bar{c}$ 2.90 ± 0.35

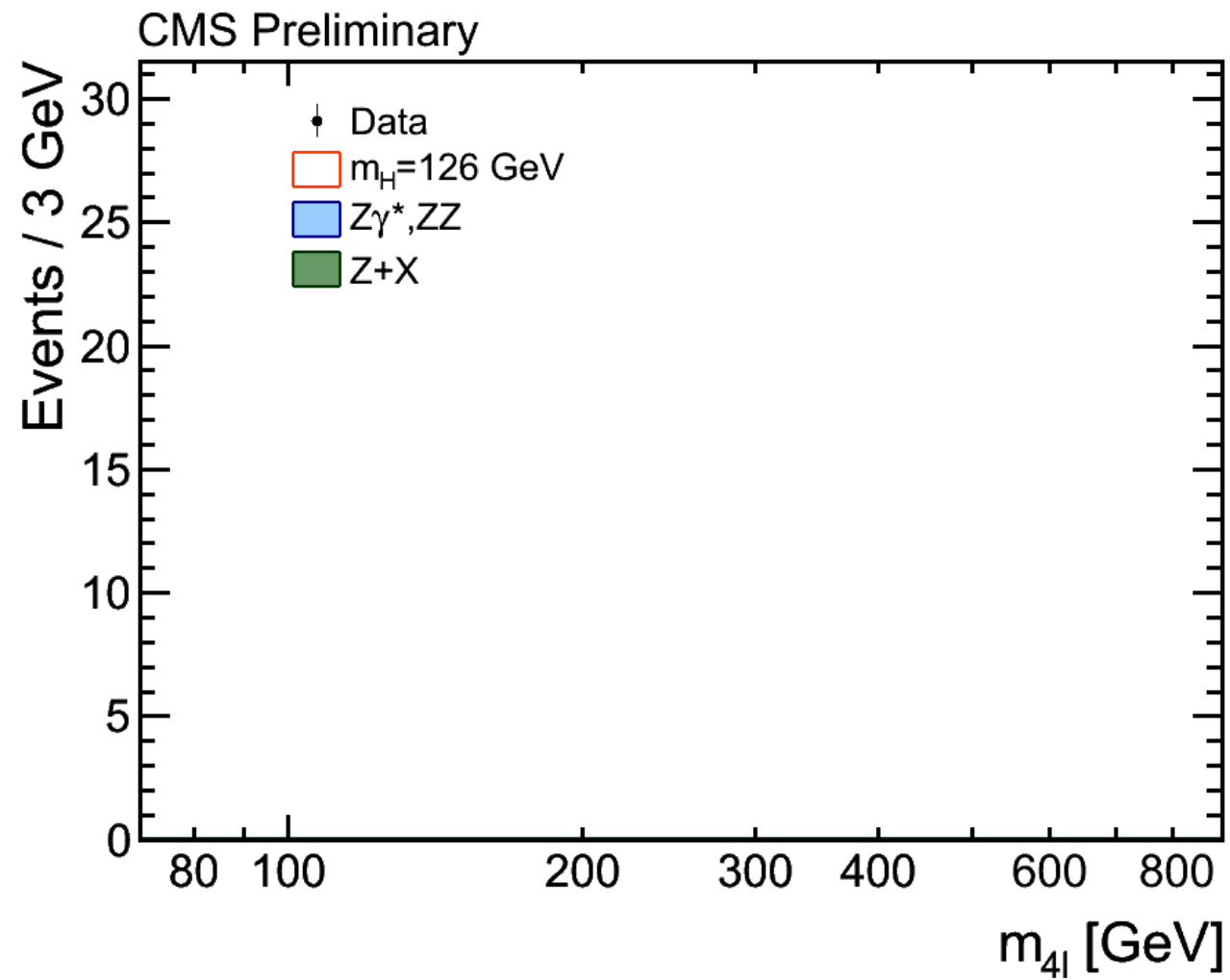
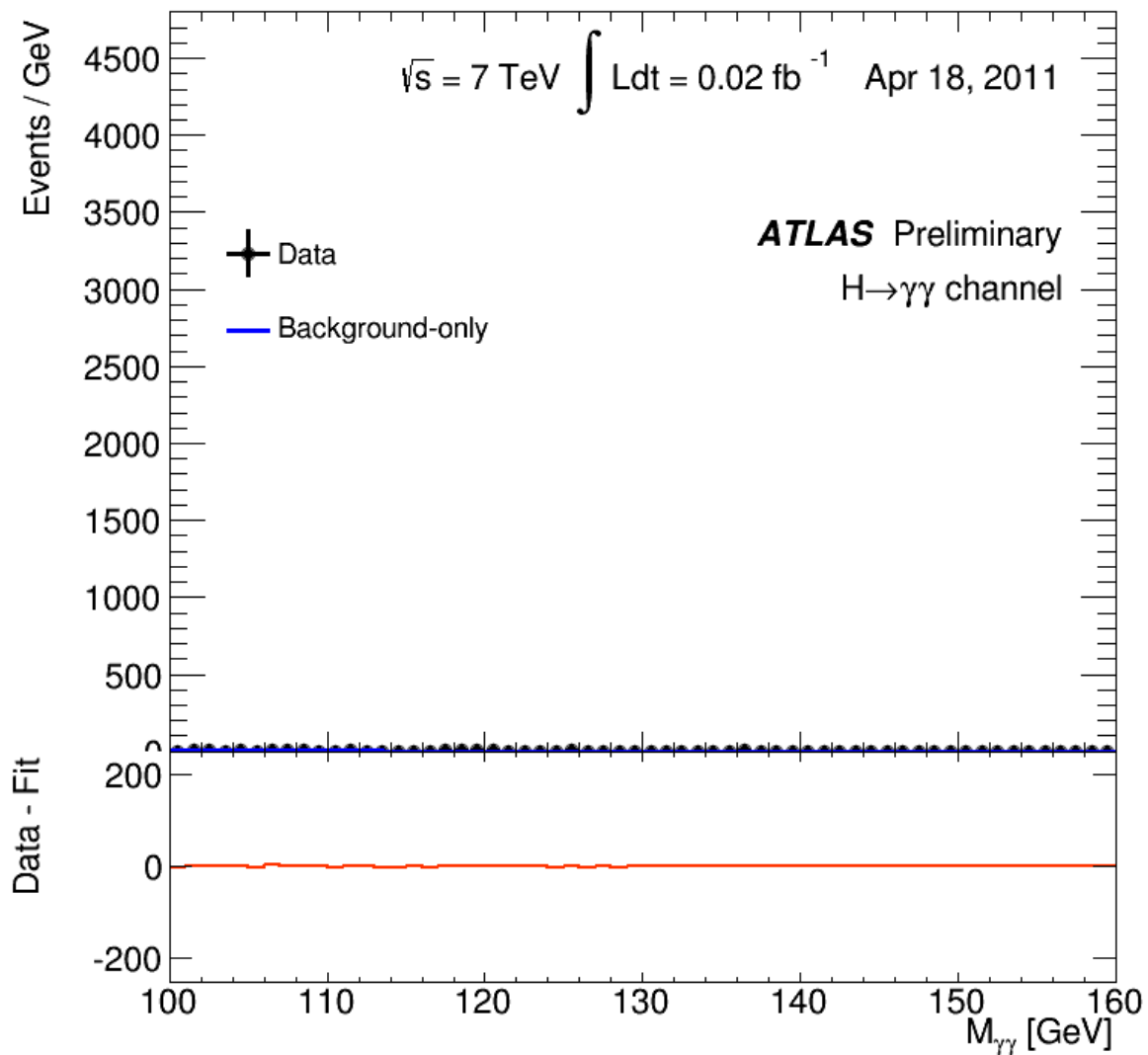
$H \rightarrow ZZ$ 2.67 ± 0.11

$H \rightarrow \gamma\gamma$ 0.228 ± 0.011

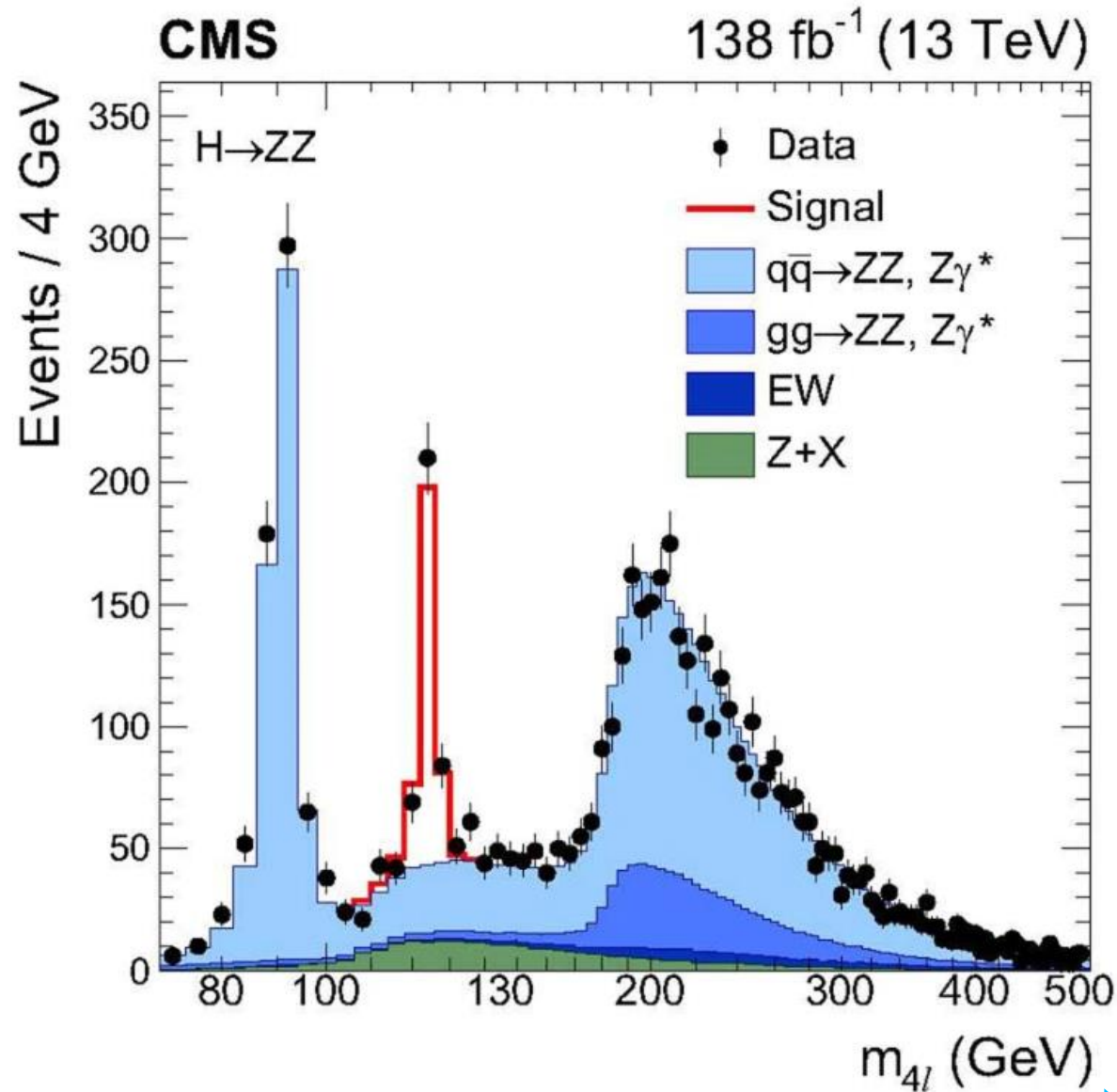
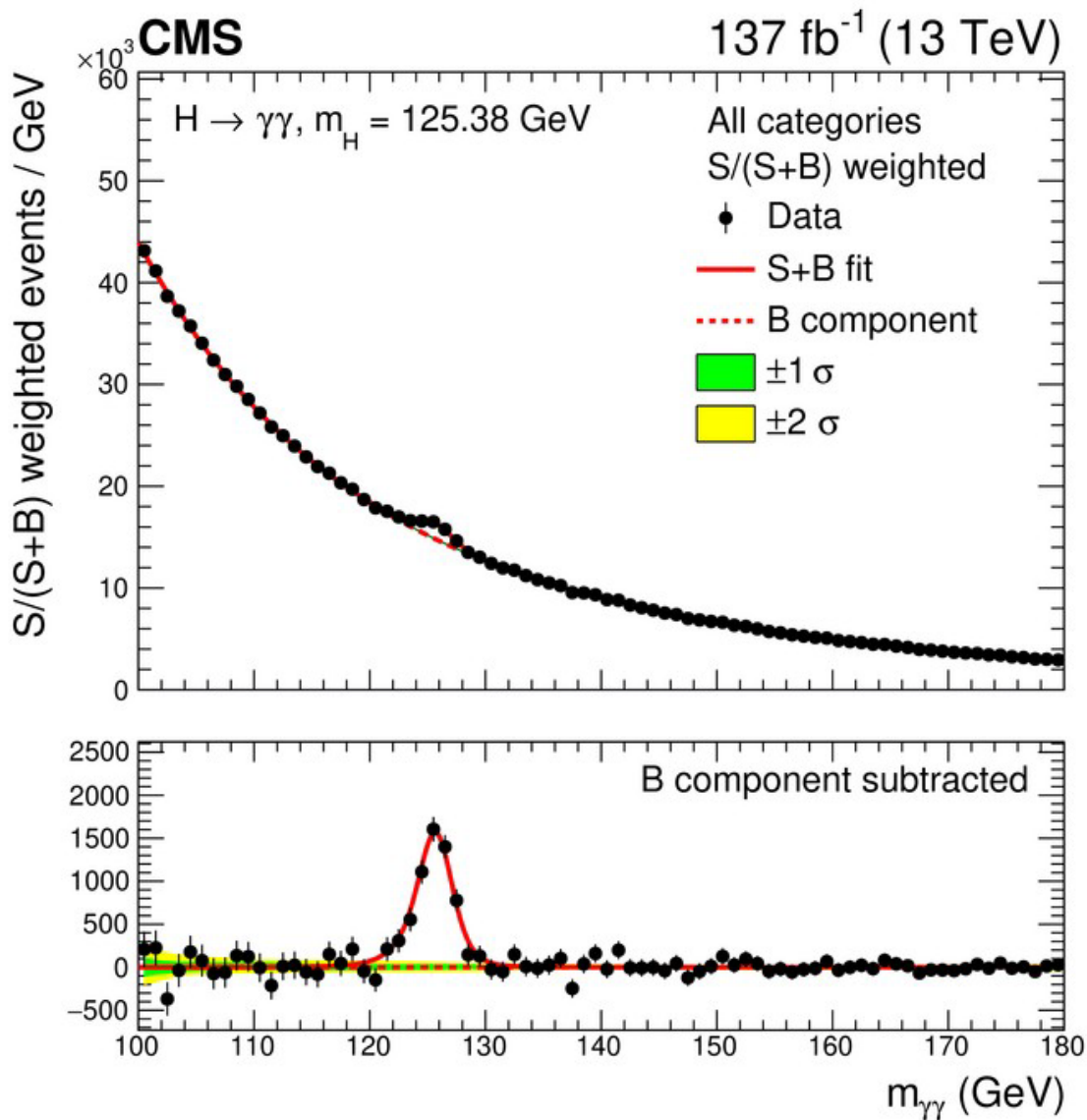
$H \rightarrow Z\gamma$ 0.155 ± 0.014

$H \rightarrow \mu\mu$ 0.022 ± 0.001

Dati 2011-2012: $H \rightarrow \gamma\gamma$... $H \rightarrow ZZ$

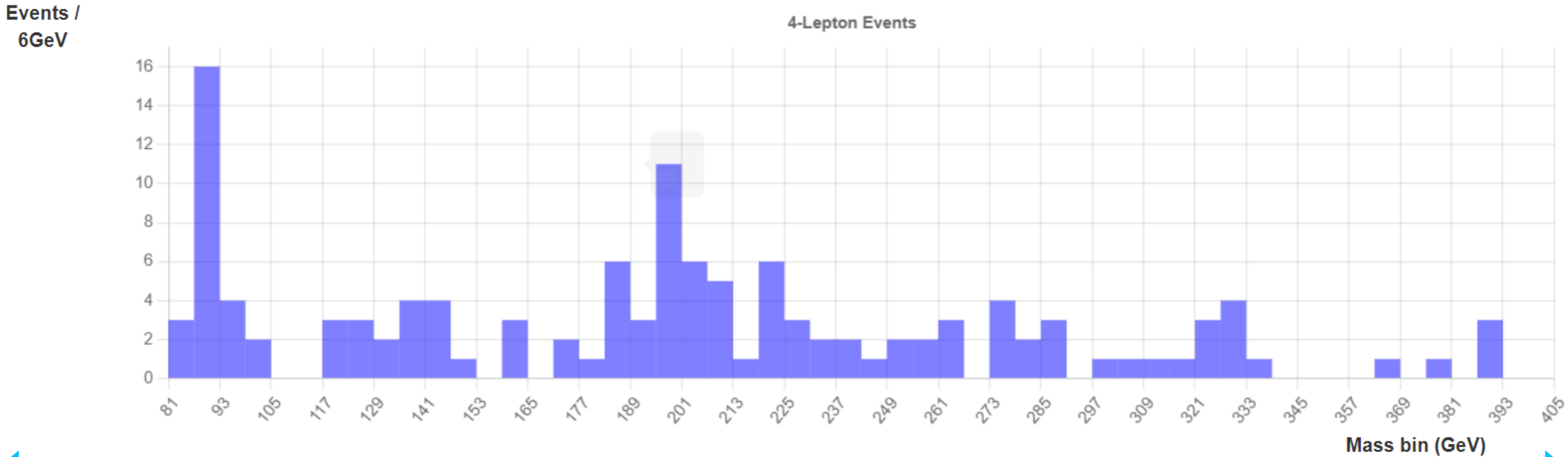


Dati 2015-2018: $H \rightarrow \gamma\gamma \dots H \rightarrow ZZ$



Risultati: istogramma di massa ($H \rightarrow ZZ$)

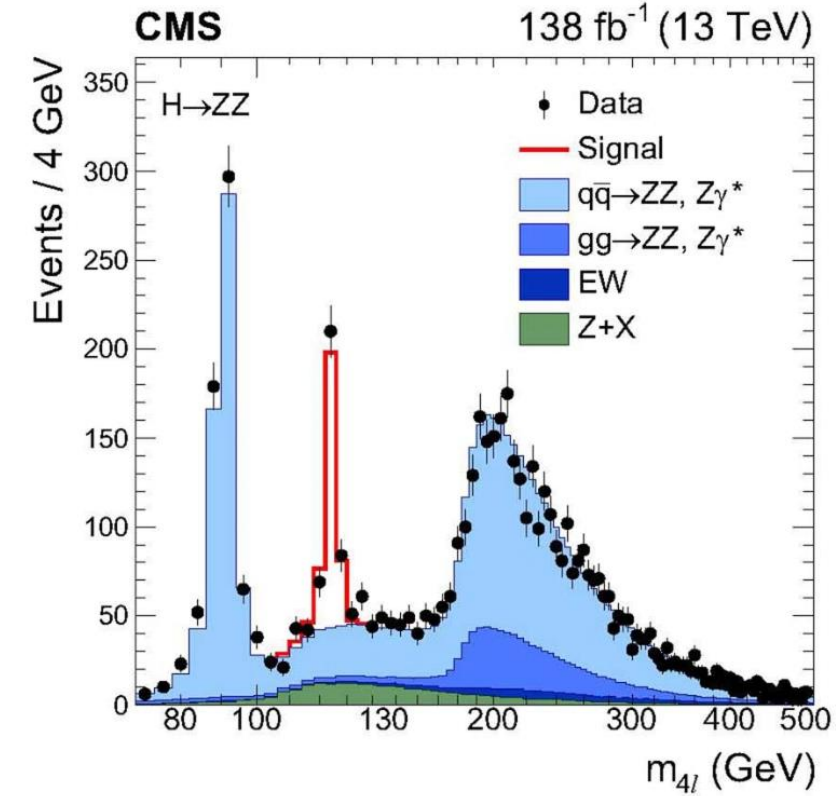
- Domande:
 - Cosa si vede?
 - C'è un picco?
 - Quale massa [GeV]?
 - A quale particella corrisponde?
 - Ci sono altri picchi?



Risultati: istogramma di massa ($H \rightarrow ZZ$)

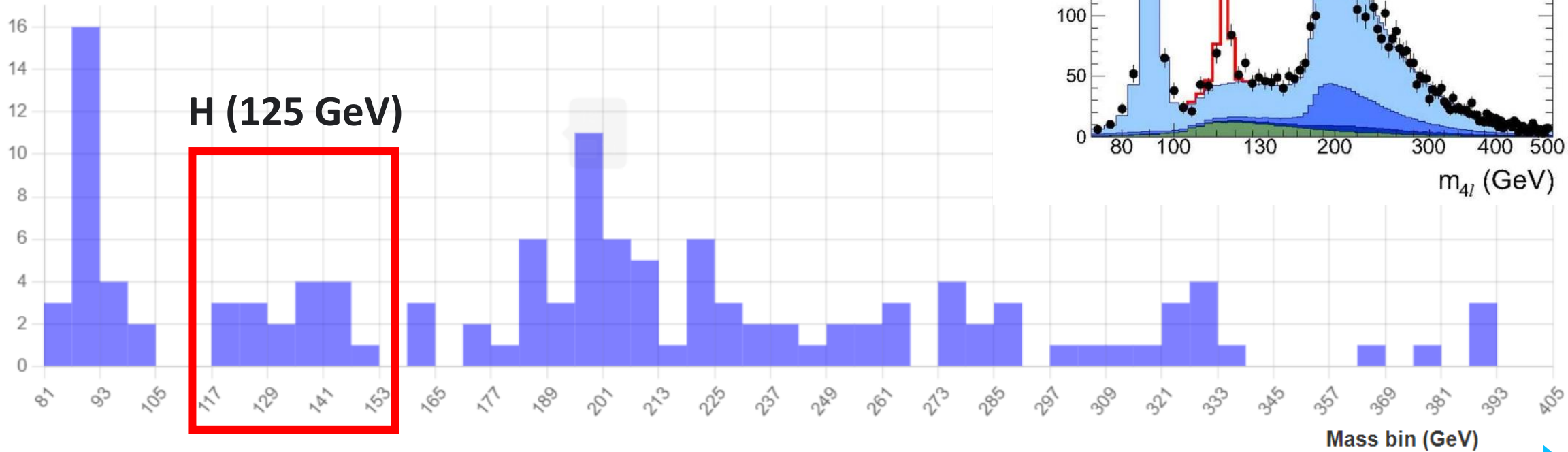
• Domande:

- Cosa si vede?
- C'è un picco?
 - Quale massa [GeV]?
 - A quale particella corrisponde?
- Ci sono altri picchi?



Events /
6GeV

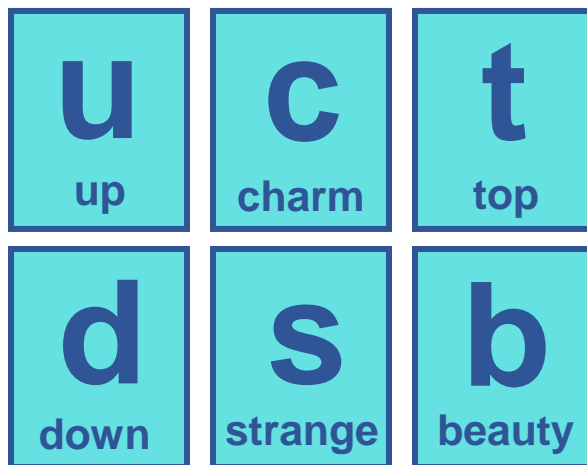
4-Lepton Events



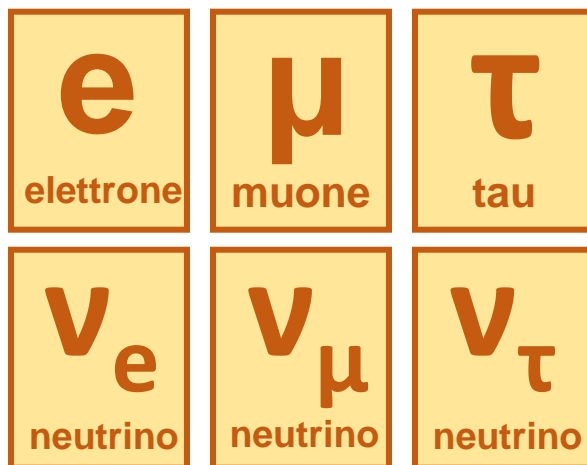
H (125 GeV)

Fisica: Modello Standard

Quark



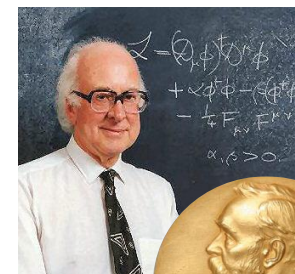
Leptoni

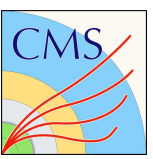


Bosoni



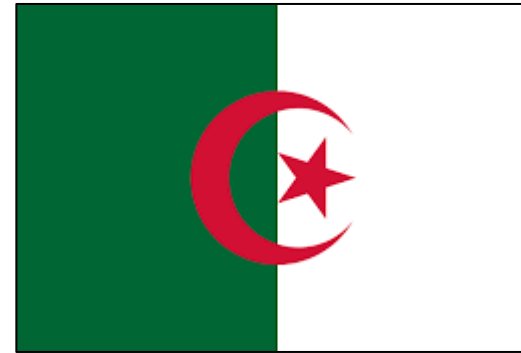
Higgs





Video conferenza ore 16:00

- **Ci collegheremo con il CERN!**
- Ci saranno 2 moderatori:
- **Parteciperanno anche altri 5 istituti!**
 - Firenze e Pavia
 - Pogdorica (Montenegro)
 - M'Sila (Algeria)
 - Helsinki (Finlandia)



Risultati: numeri e frequenze

- Domande:

- Quanti elettroni? Quanti muoni?
 - Rapporto tra elettroni/muoni: 0.98
 - Previsione: 1 (Universalità leptonica)

- $W \rightarrow e \nu_e$
- $W \rightarrow \mu \nu_\mu$
- $W \rightarrow \tau \nu_\tau$
- $Z \rightarrow e e$
- $Z \rightarrow \mu \mu$
- $Z \rightarrow \tau \tau$
- $Z \rightarrow \nu_e \nu_e$
- $Z \rightarrow \nu_\mu \nu_\mu$
- $Z \rightarrow \nu_\tau \nu_\tau$

Leptoni

e elettrone	μ muone	τ tau
ν_e neutrino	ν_μ neutrino	ν_τ neutrino

Total:

Group	e	μ	W+	W-	W \pm	Neutral	Zoo	Total
All	774	788	308	244	340	570	143	1605

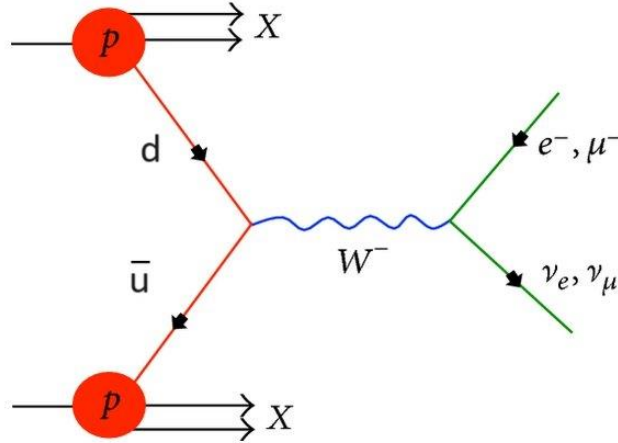
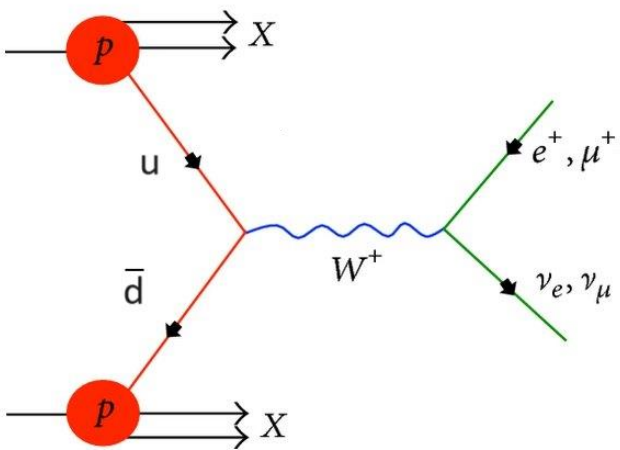
Risultati: numeri e frequenze

- Domande:

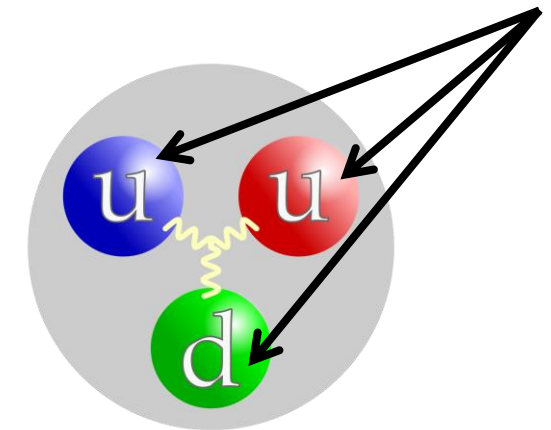
- Quanti W^+ ? Quanti W^- ?

- Rapporto tra W^+/W^- : 1.3

- Previsione: 1.4 (Rapporto quark up/down nel protone)



Protone Quark



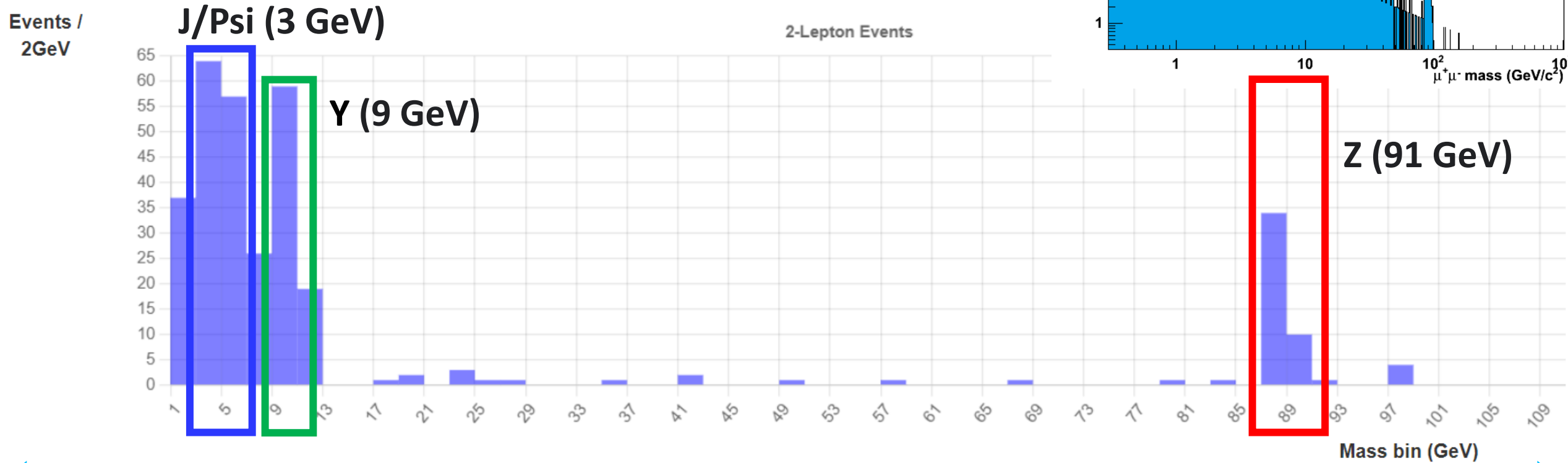
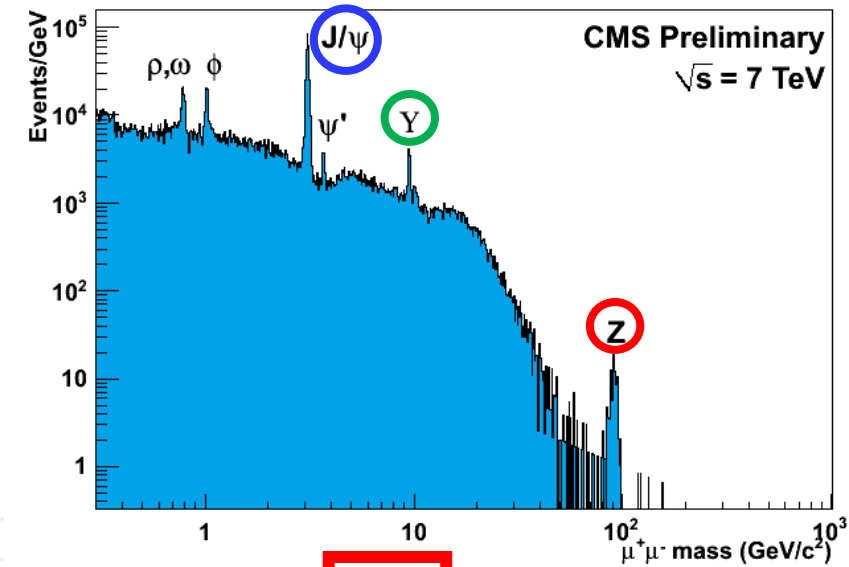
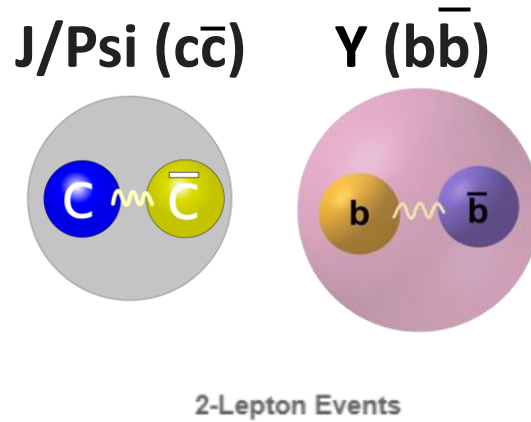
Total:

Group	e	μ	W+	W-	W^\pm	Neutral	Zoo	Total
All	774	788	308	244	340	570	143	1605

Risultati: istogramma di massa ($Z \rightarrow ee/\mu\mu$)

• Domande:

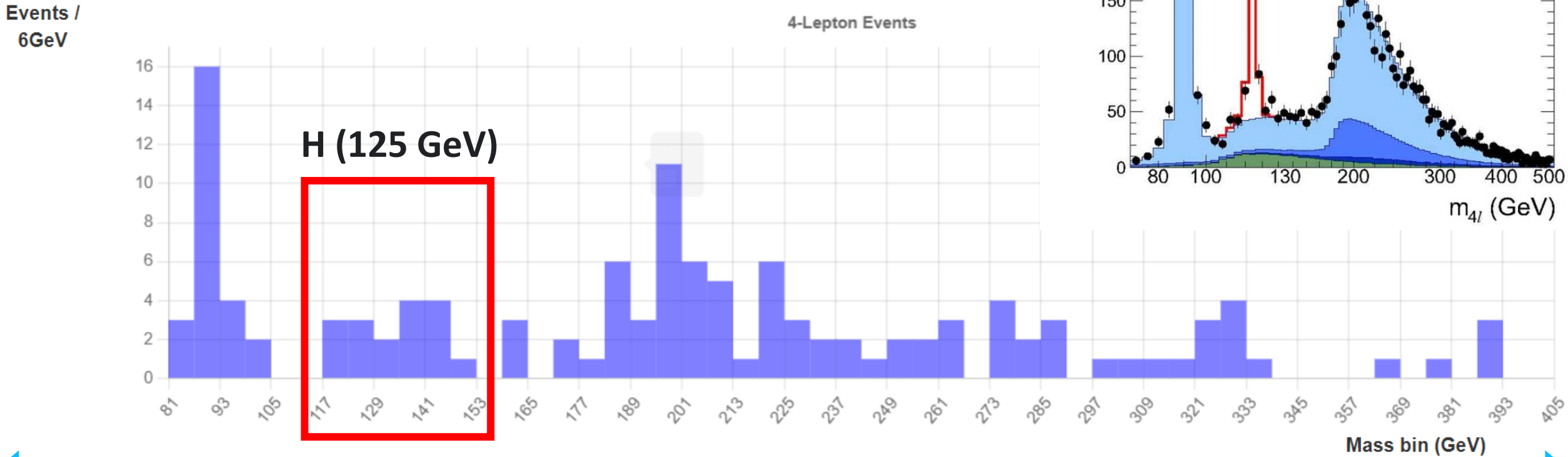
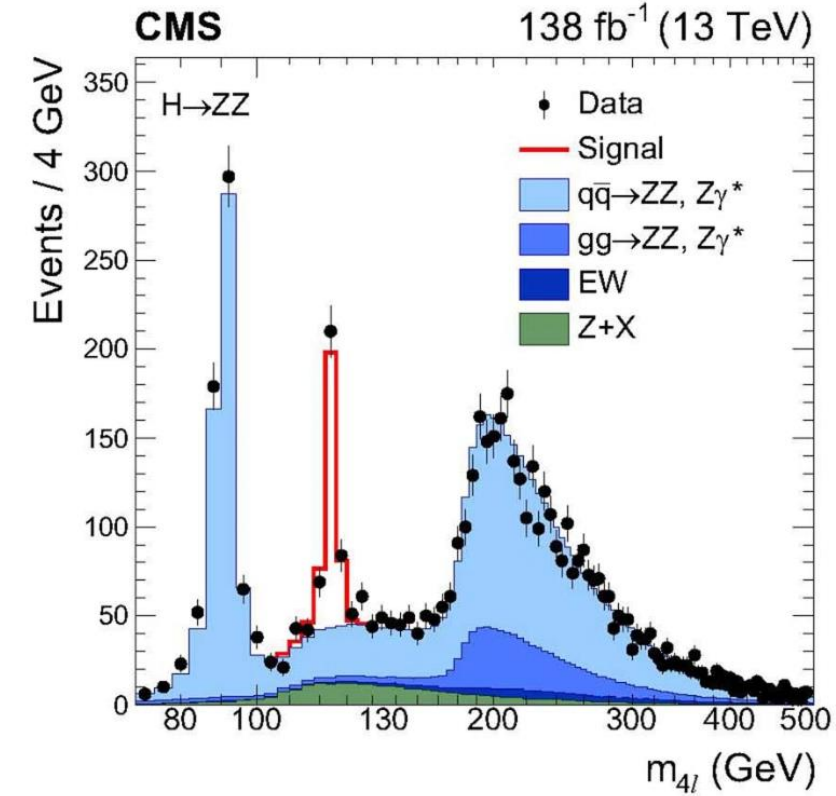
- Cosa si vede?
- C'è un picco?
 - Quale massa [GeV]?
 - A quale particella corrisponde?
- Ci sono altri picchi?



Risultati: istogramma di massa ($H \rightarrow ZZ$)

• Domande:

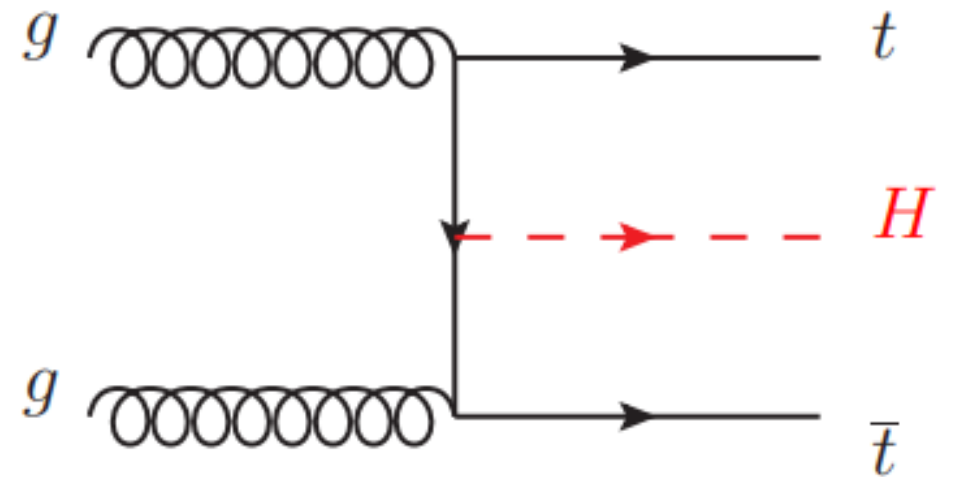
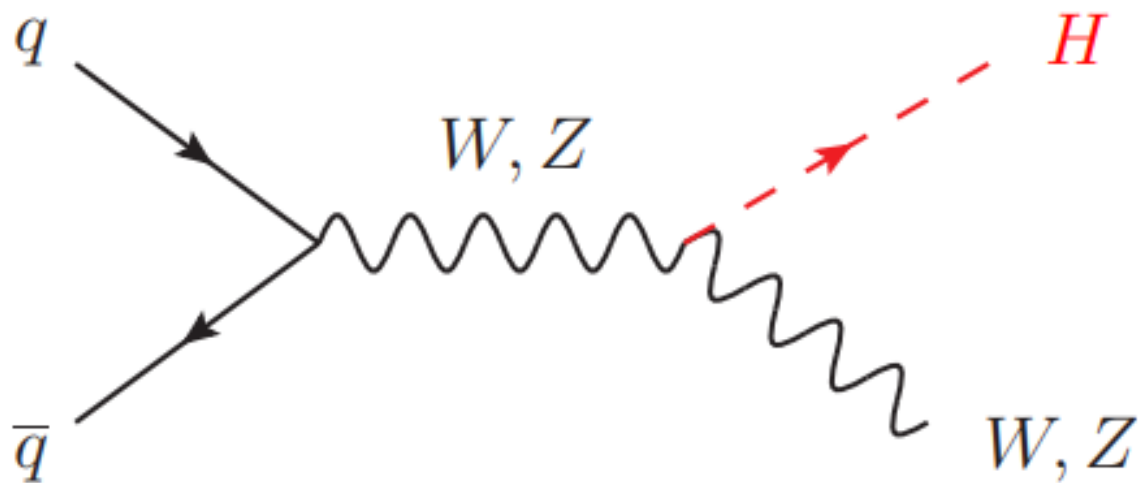
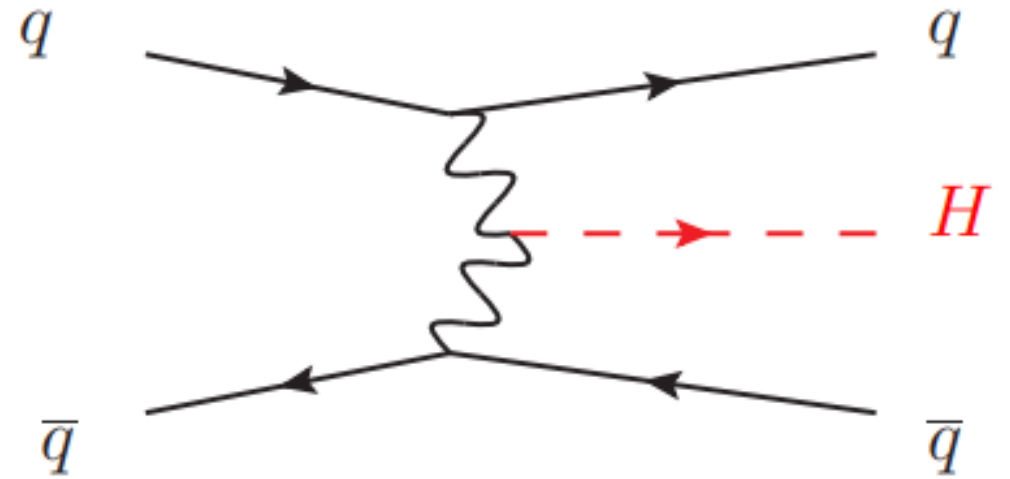
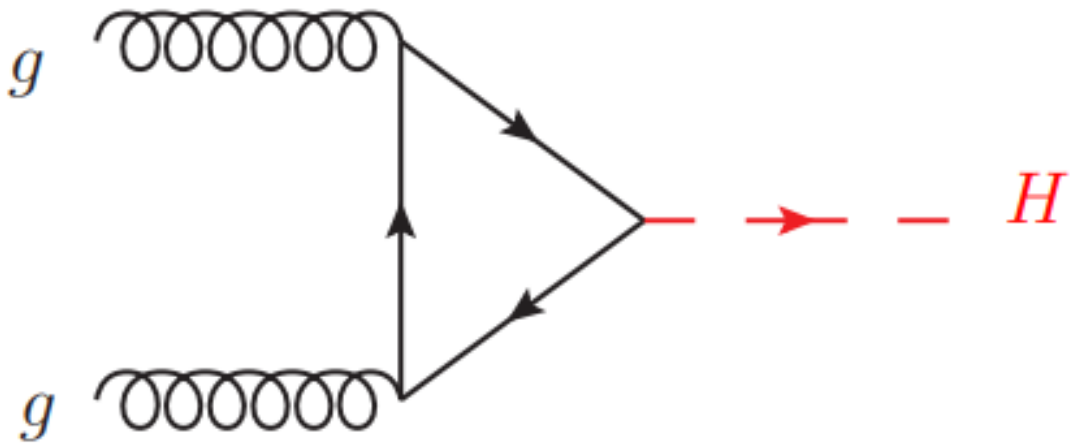
- Cosa si vede?
- C'è un picco?
 - Quale massa [GeV]?
 - A quale particella corrisponde?
- Ci sono altri picchi?



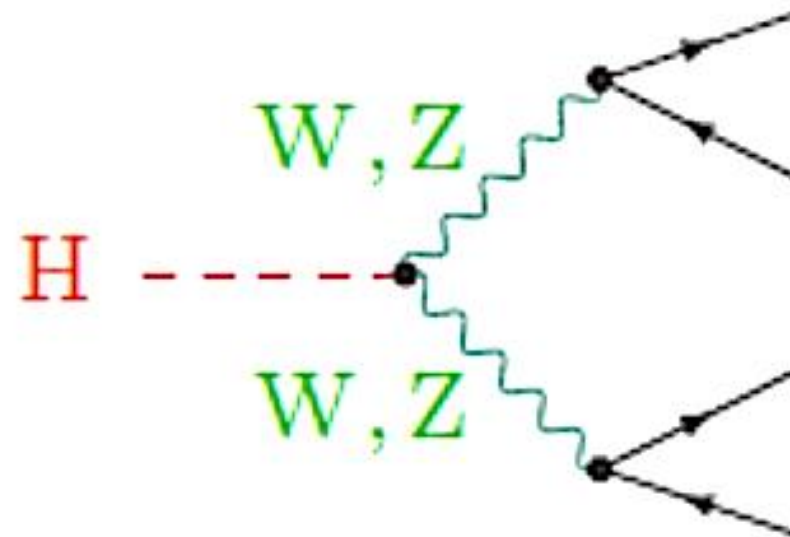
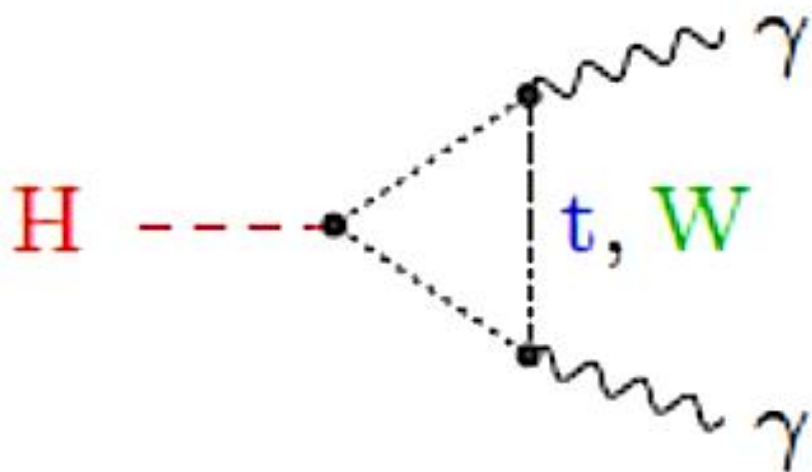
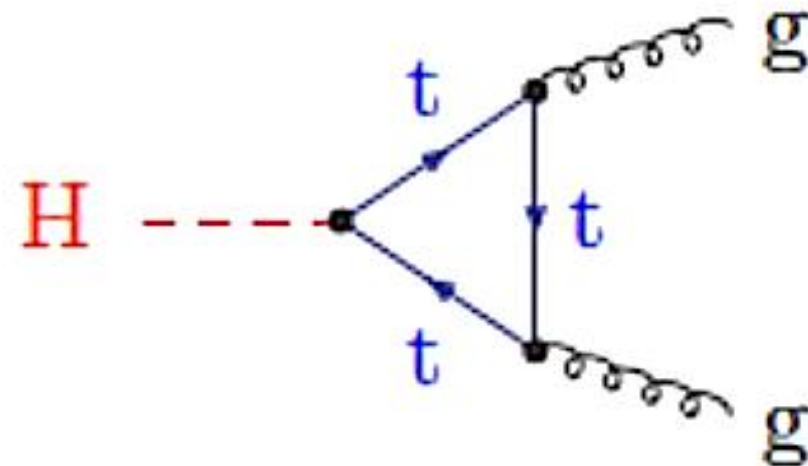
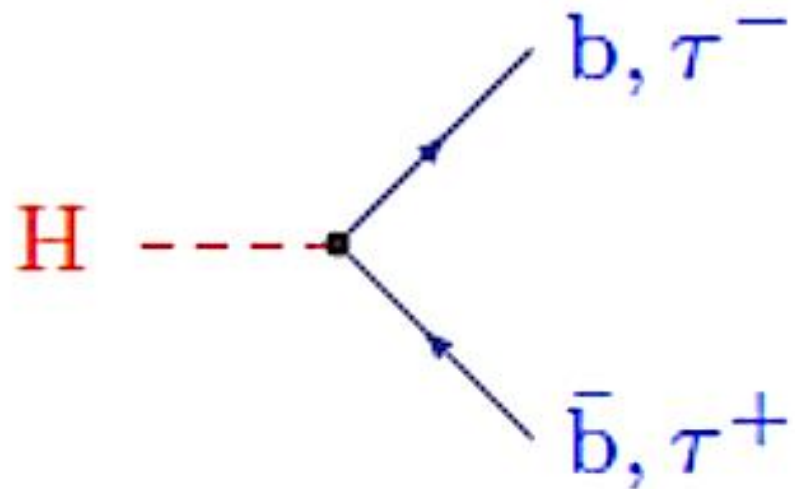


Backup

Processi di produzione del Bosone di Higgs



Canali di Decadimento del Bosone di Higgs



- Interazione con bosone di Higgs proporzionale alla massa!

- t : 173 GeV
- Z : 90 GeV
- W : 80 GeV
- b : 4 GeV
- τ : 2 GeV
- μ : 0.1 GeV

