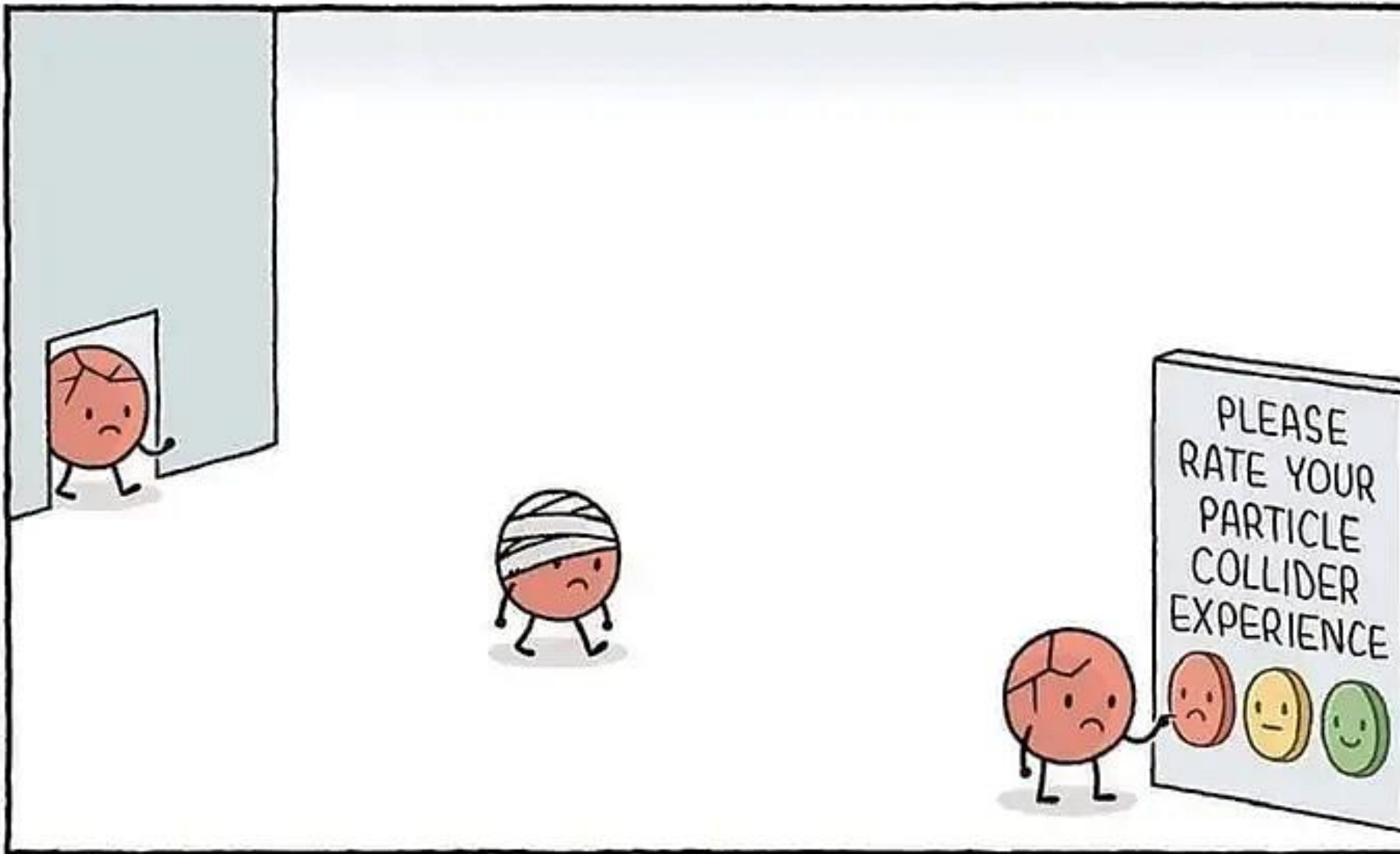
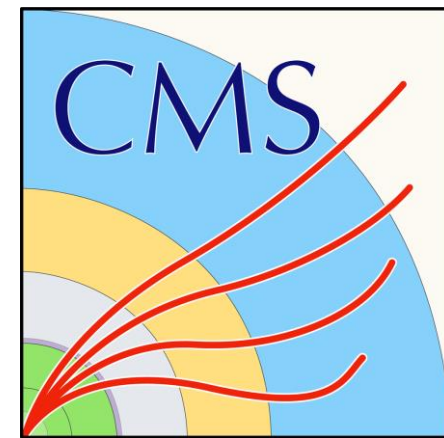
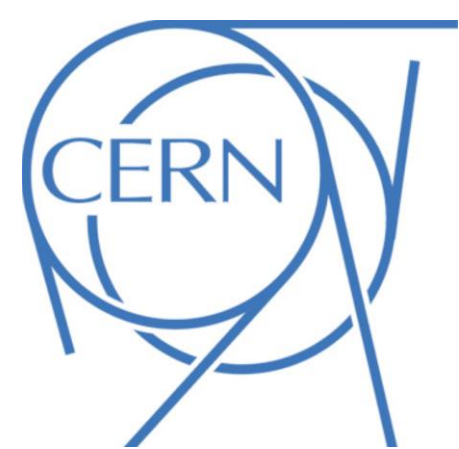


Compilare il questionario!





Discussione dei Risultati

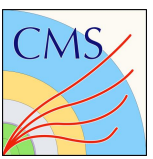
01/03/2024

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

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 - Previsione: 1 (Universalità leptonica)

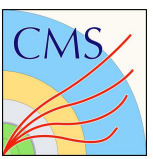
- $W \rightarrow e \nu_e$
- $W \rightarrow \mu \nu_\mu$
- $W \rightarrow \tau \nu_\tau$
- $Z \rightarrow e e$
- $Z \rightarrow \mu \mu$
- $Z \rightarrow \tau \tau$
- $Z \rightarrow \nu_e \nu_e$
- $Z \rightarrow \nu_\mu \nu_\mu$
- $Z \rightarrow \nu_\tau \nu_\tau$

Leptoni

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

Total:

Group	e	μ	W+	W-	W±	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

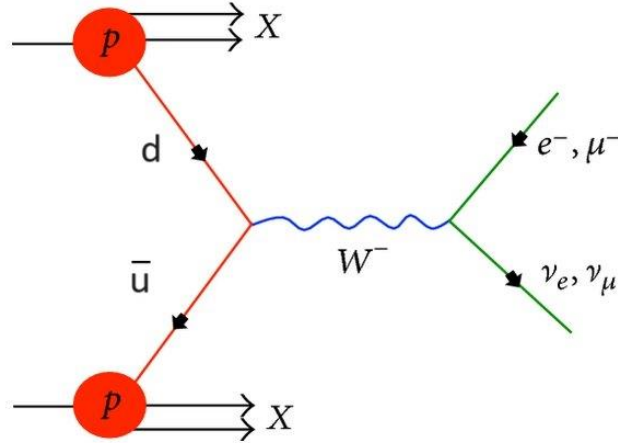
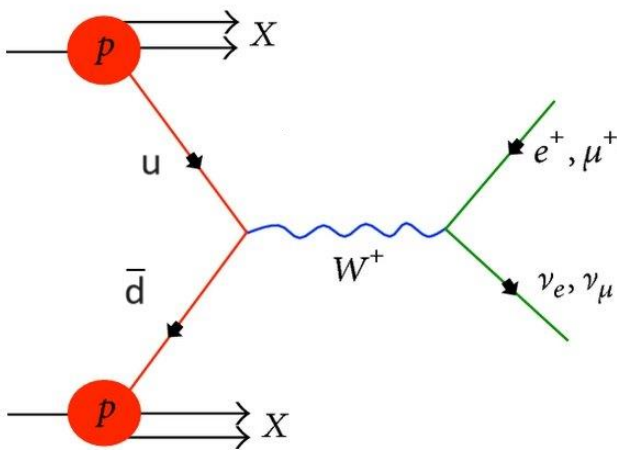
Risultati: numeri e frequenze

- Domande:

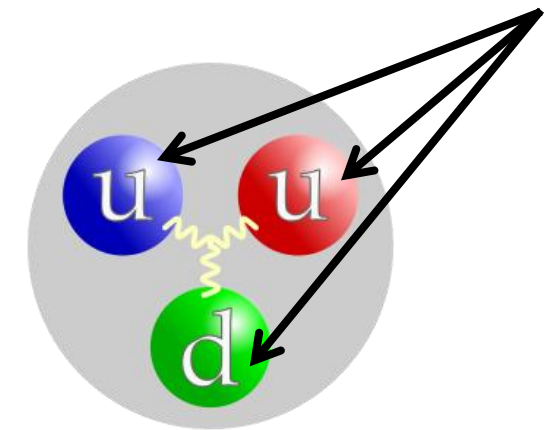
- Quanti W^+ ? Quanti W^- ?

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

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



Protone Quark

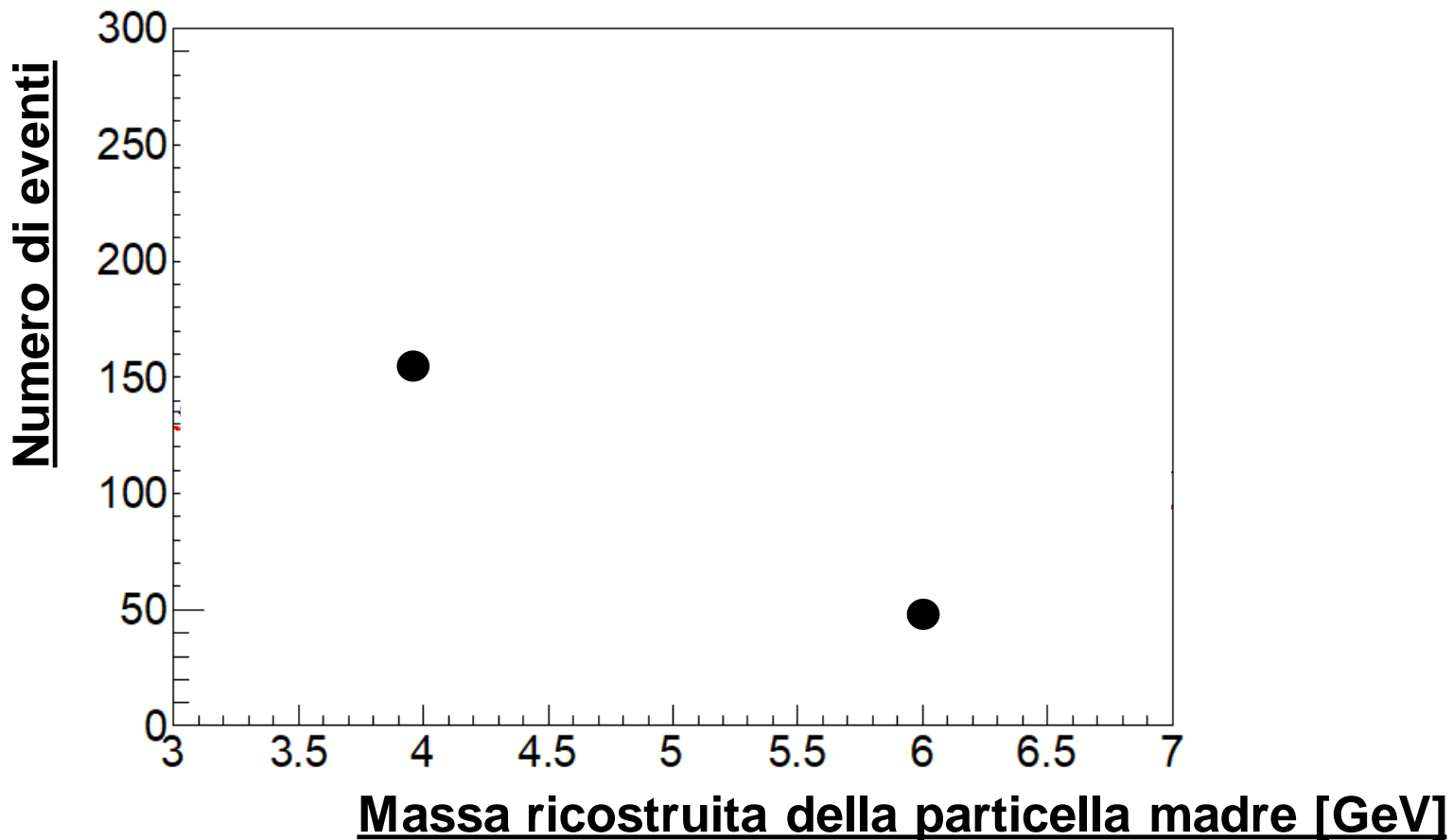


Total:

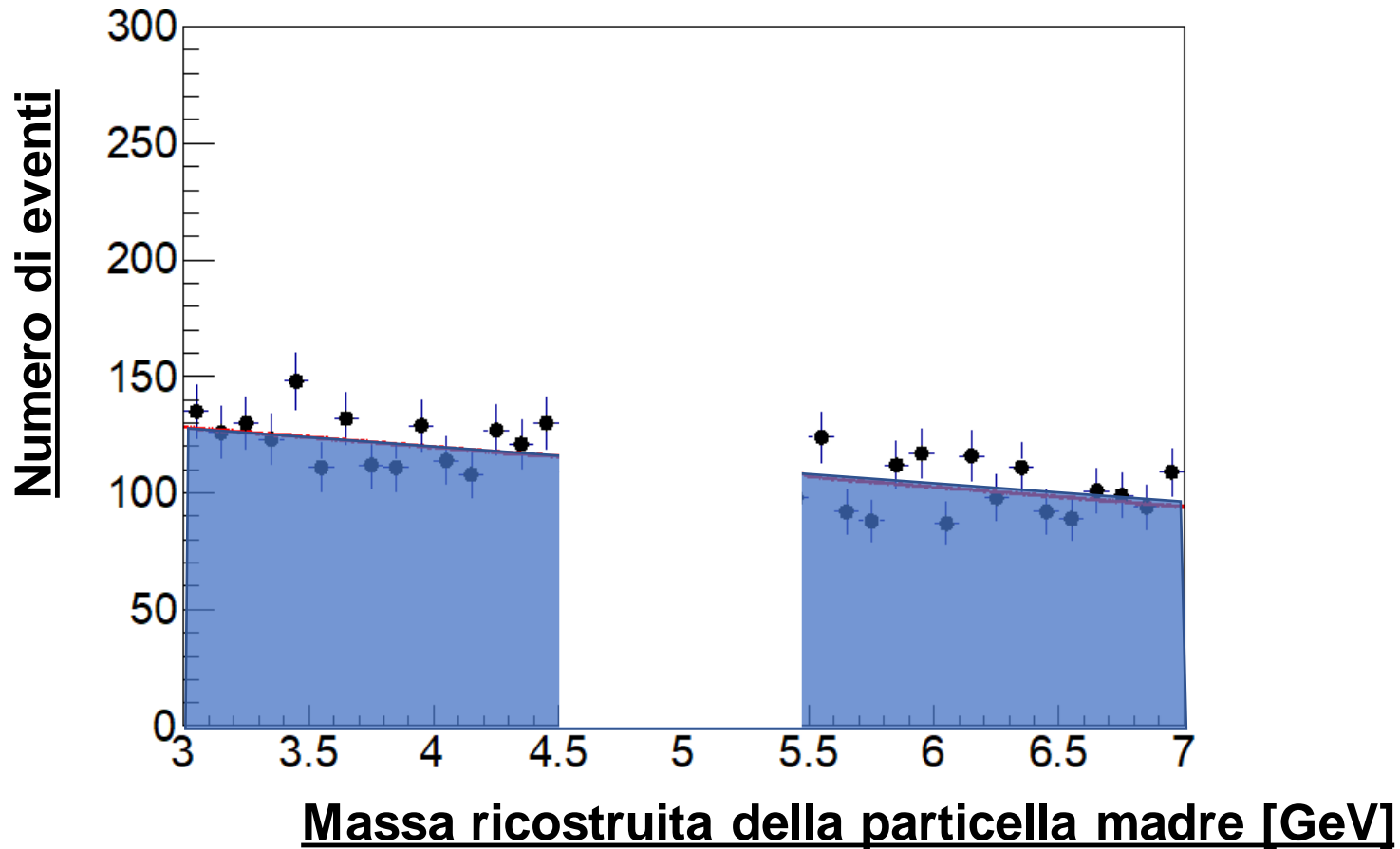
Group	e	μ	W+	W-	W^\pm	Neutral	Zoo	Total
All	774	788	308	244	340	570	143	1605

Istogramma di massa

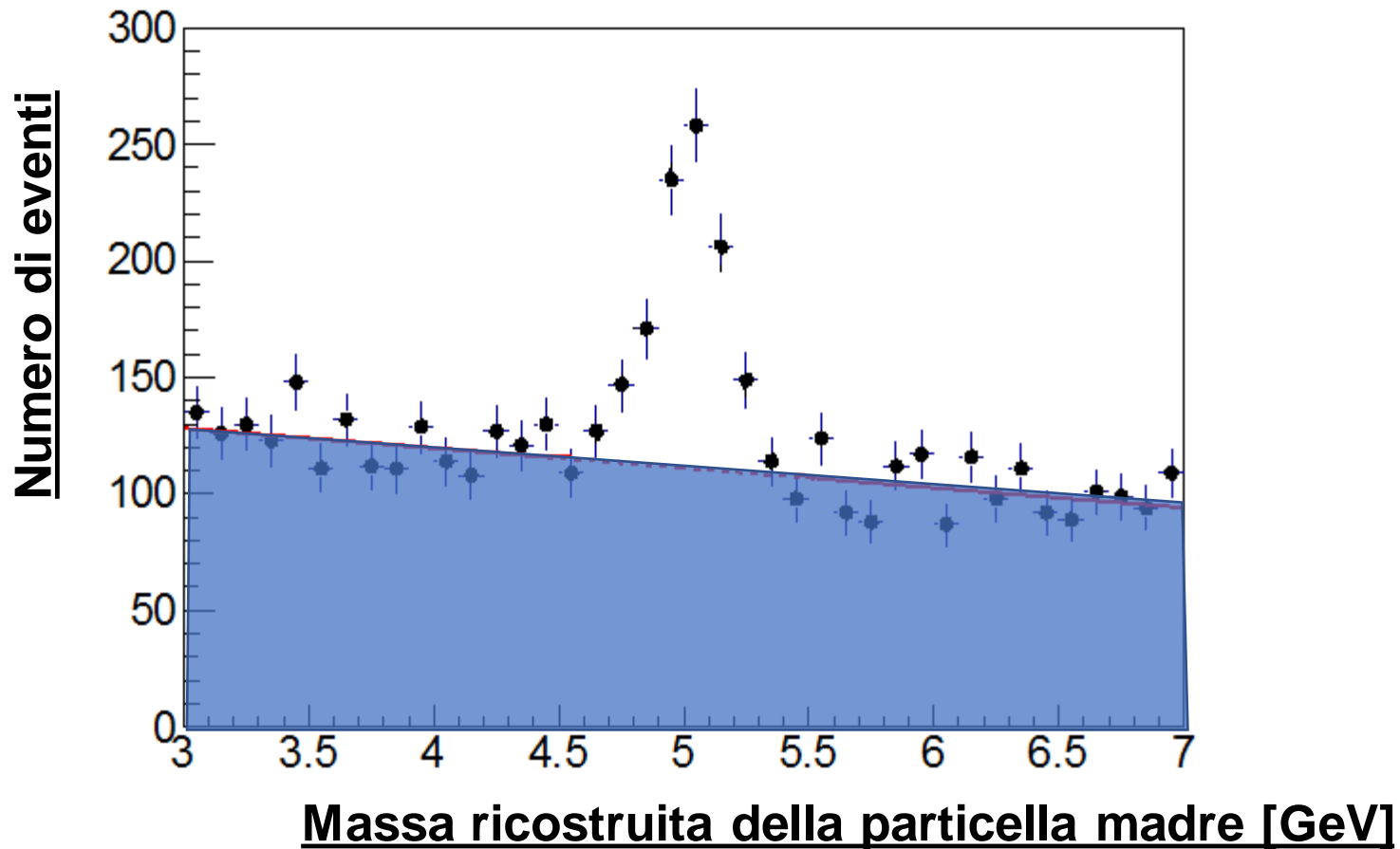
- Dopo aver identificato i segnali e classificato gli eventi
 - I dati vengono analizzati statisticamente
 - Le informazioni delle collisioni vengono sintetizzate in **istogrammi**



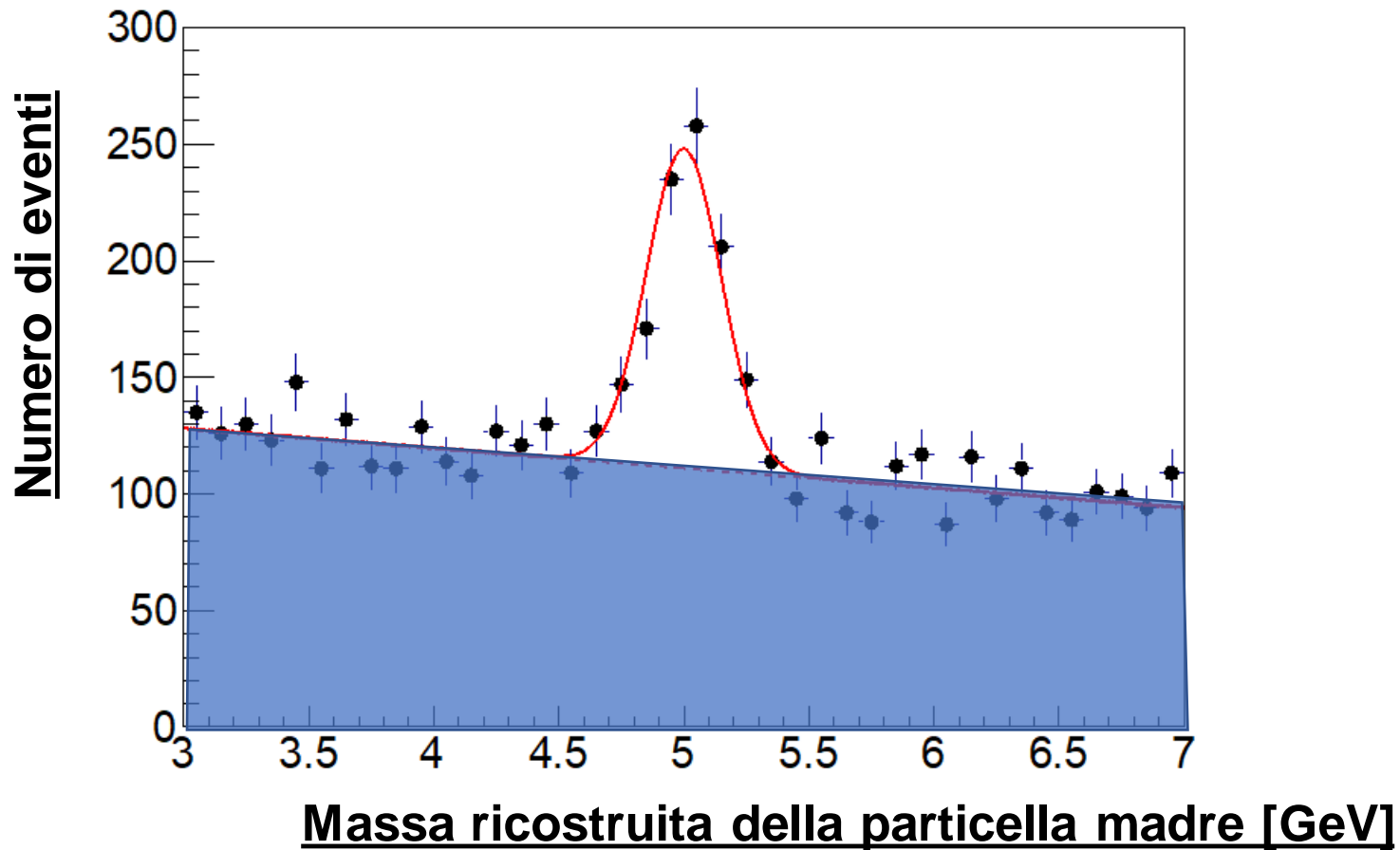
Eventi casuali distribuiti casualmente



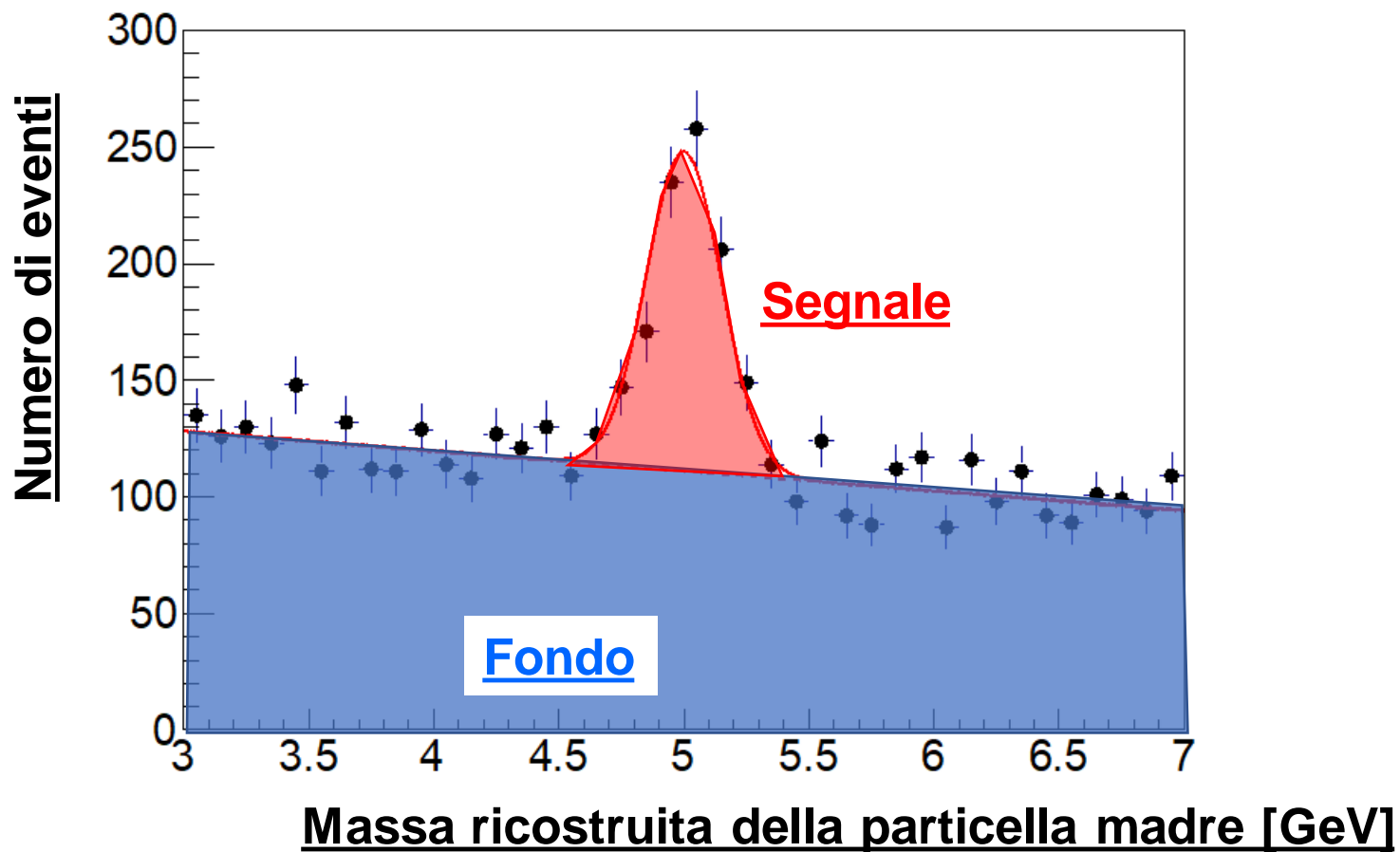
C'è qualcosa in più del previsto

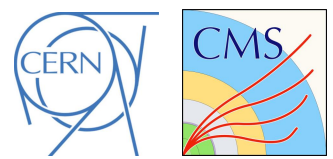


Scoperta di una particella!



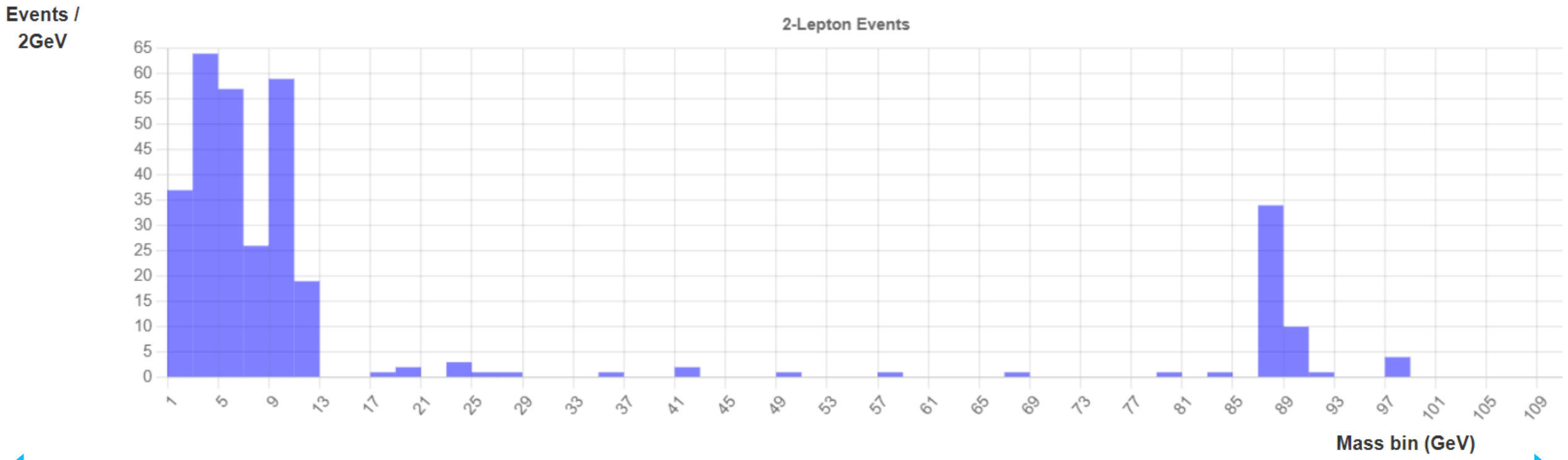
Fondo + Segnale





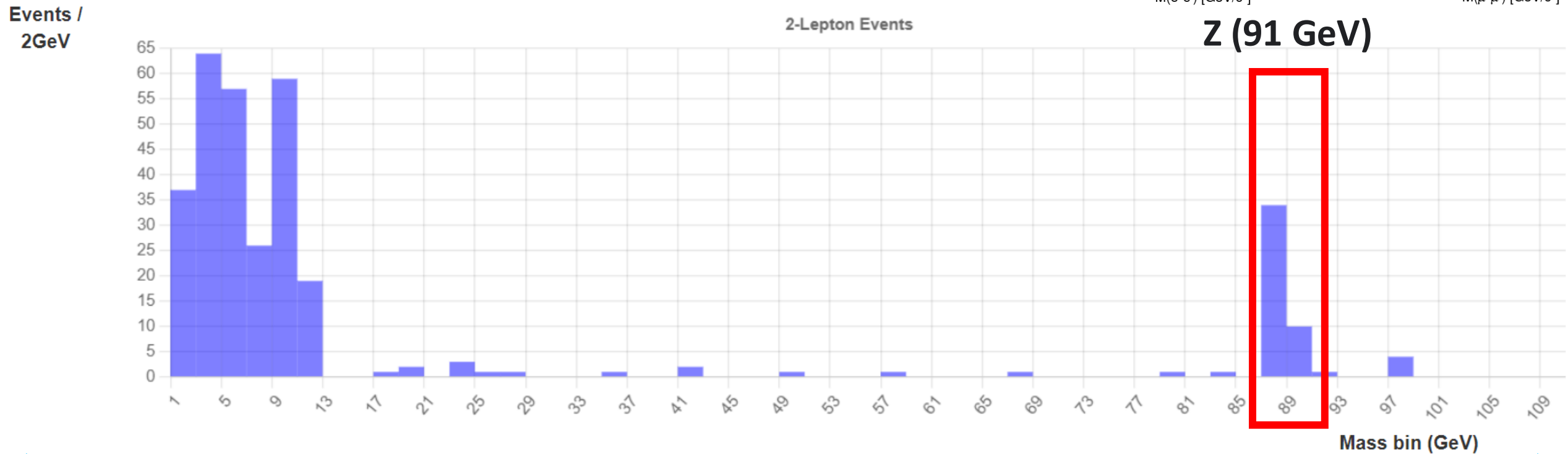
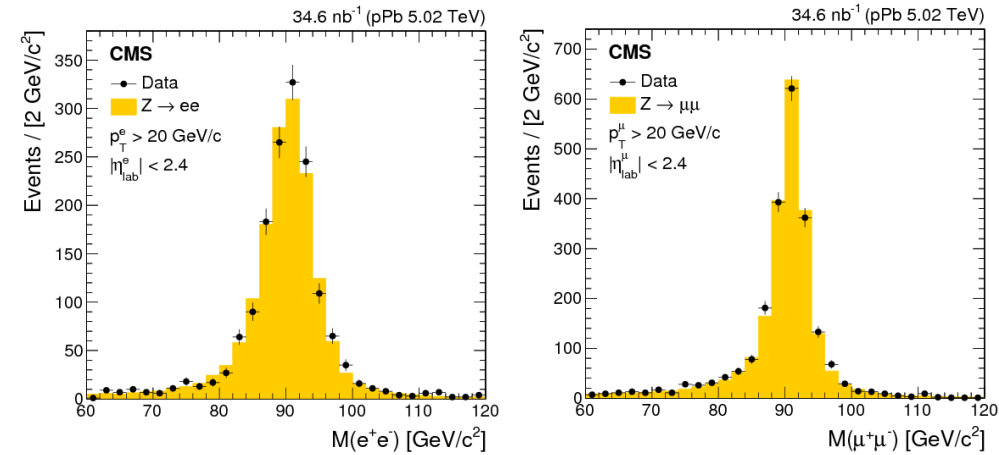
Risultati: istogramma di massa ($Z \rightarrow ee/\mu\mu$)

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



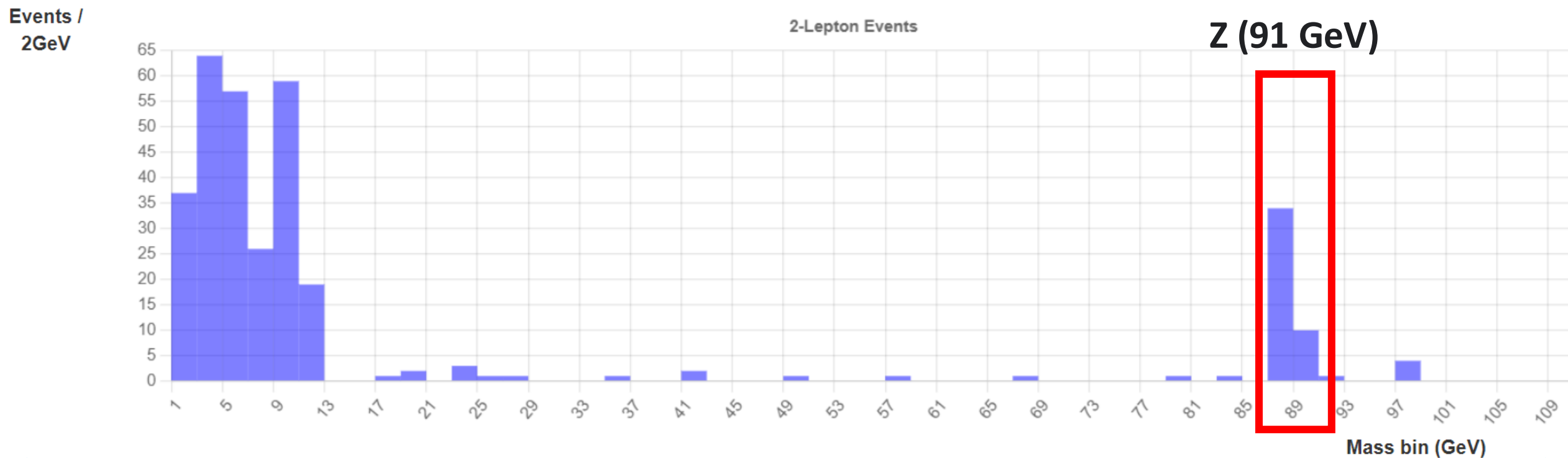
Risultati: istogramma di massa ($Z \rightarrow ee/\mu\mu$)

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

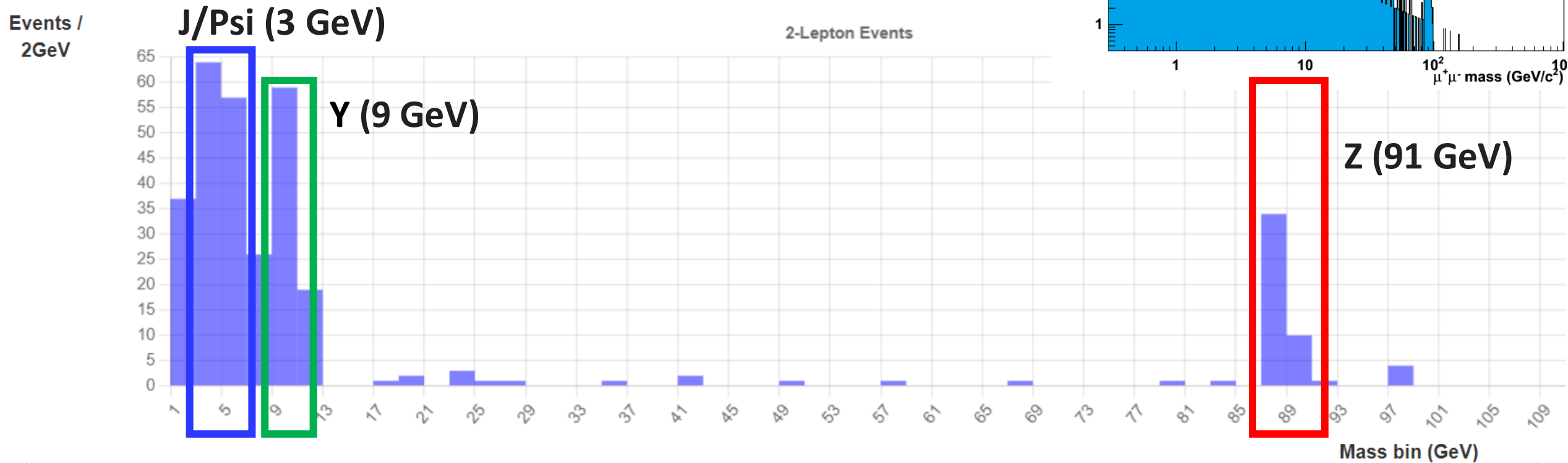
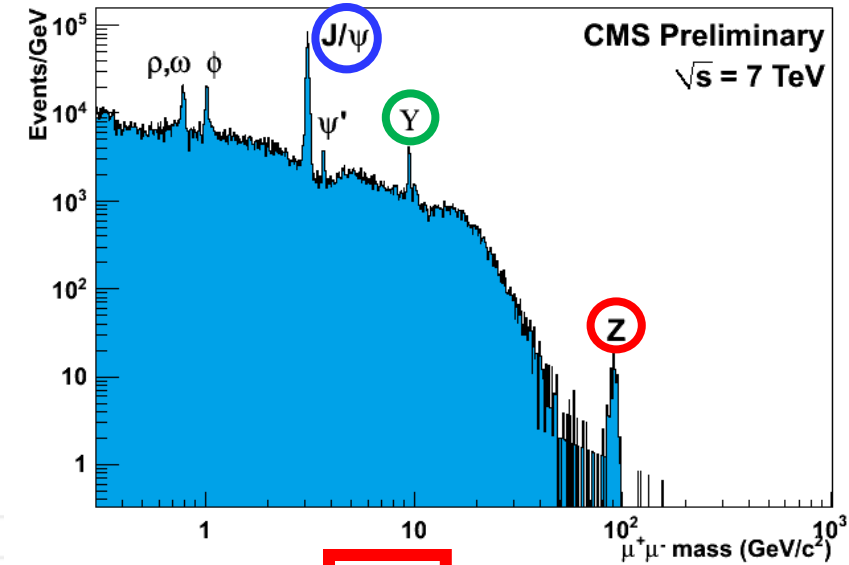
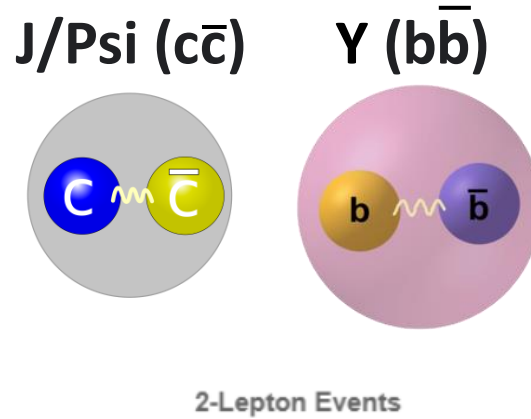
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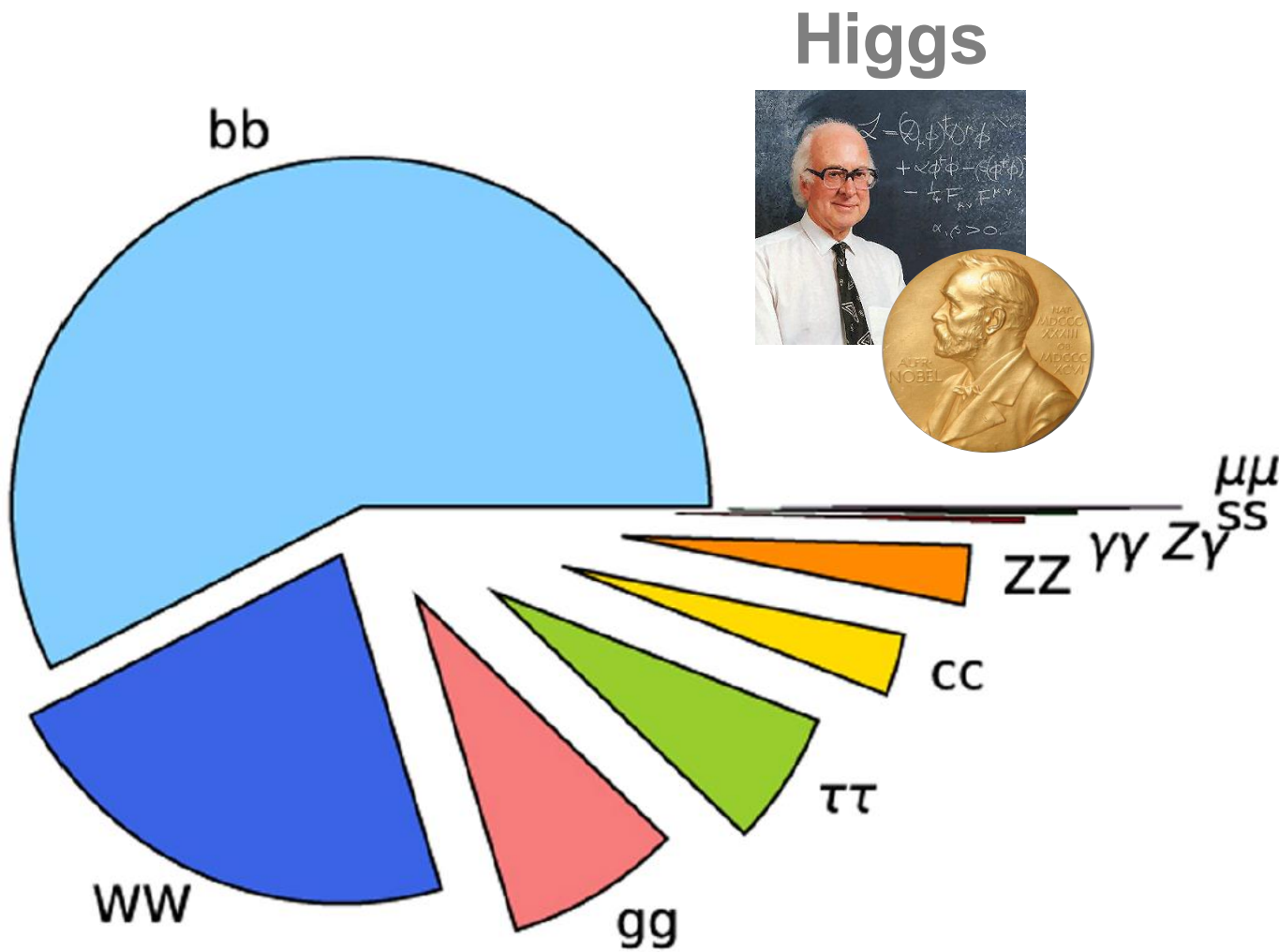
Risultati: istogramma di massa ($Z \rightarrow ee/\mu\mu$)

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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

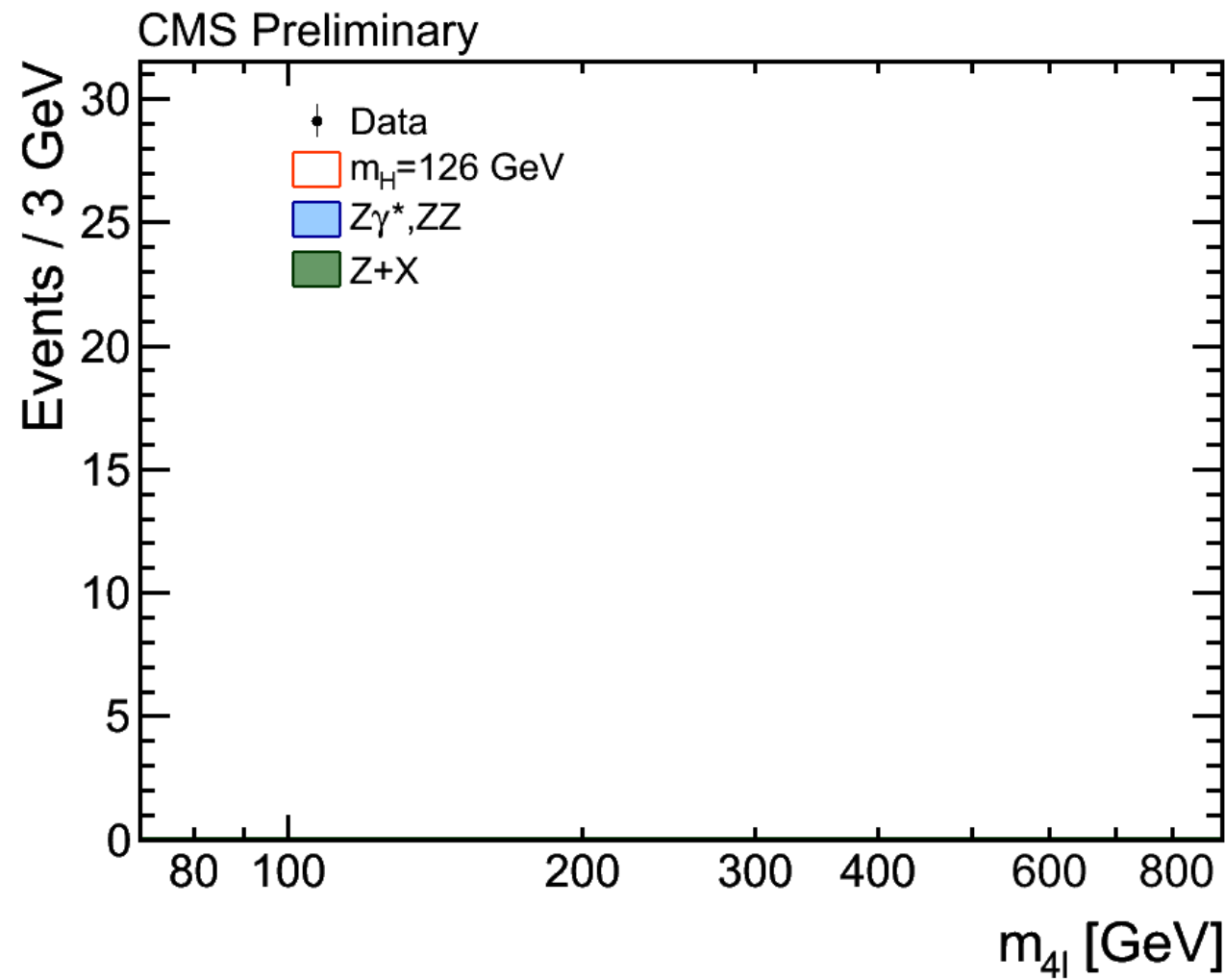
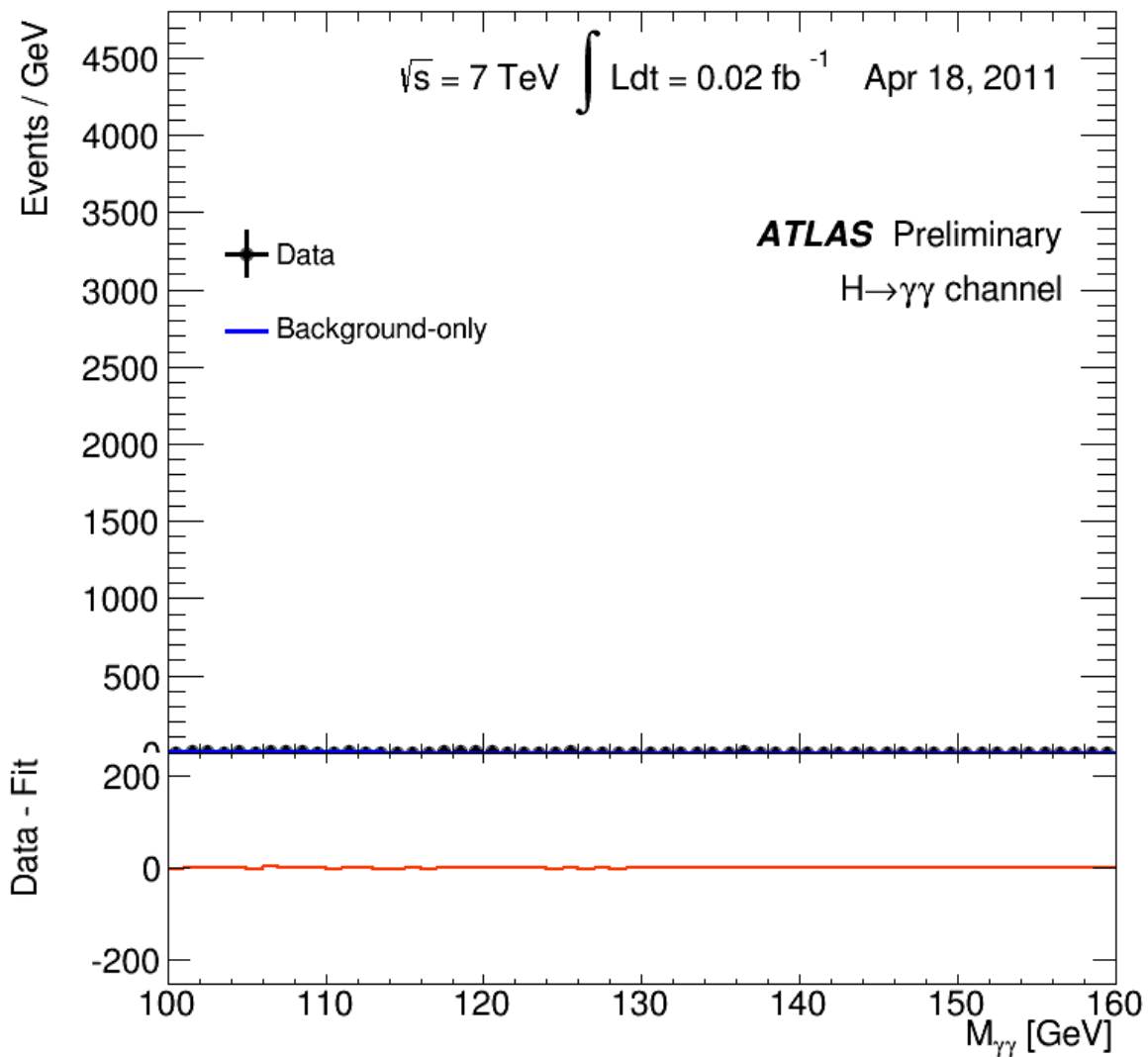
$H \rightarrow ZZ$ 2.67 ± 0.11

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

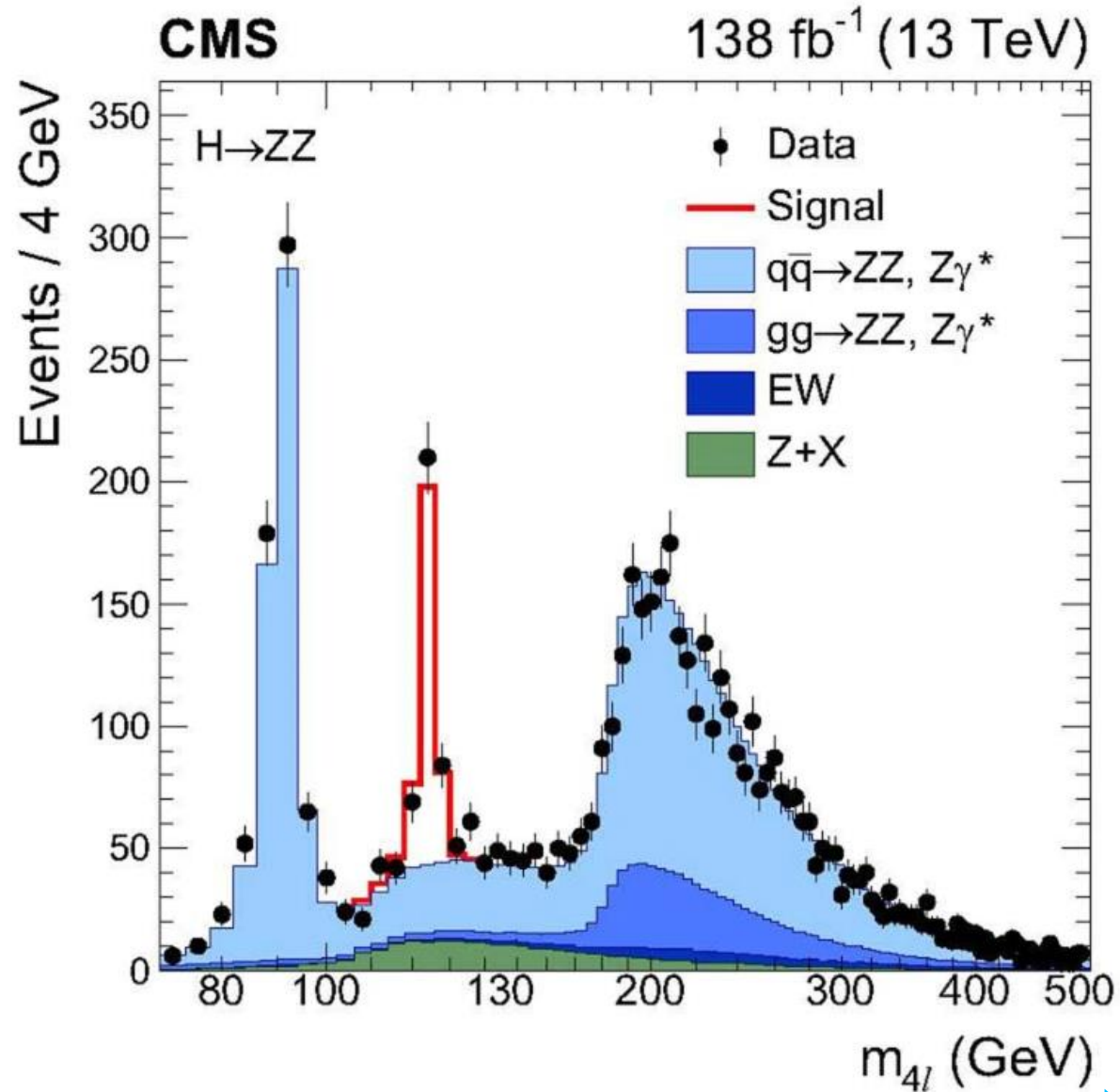
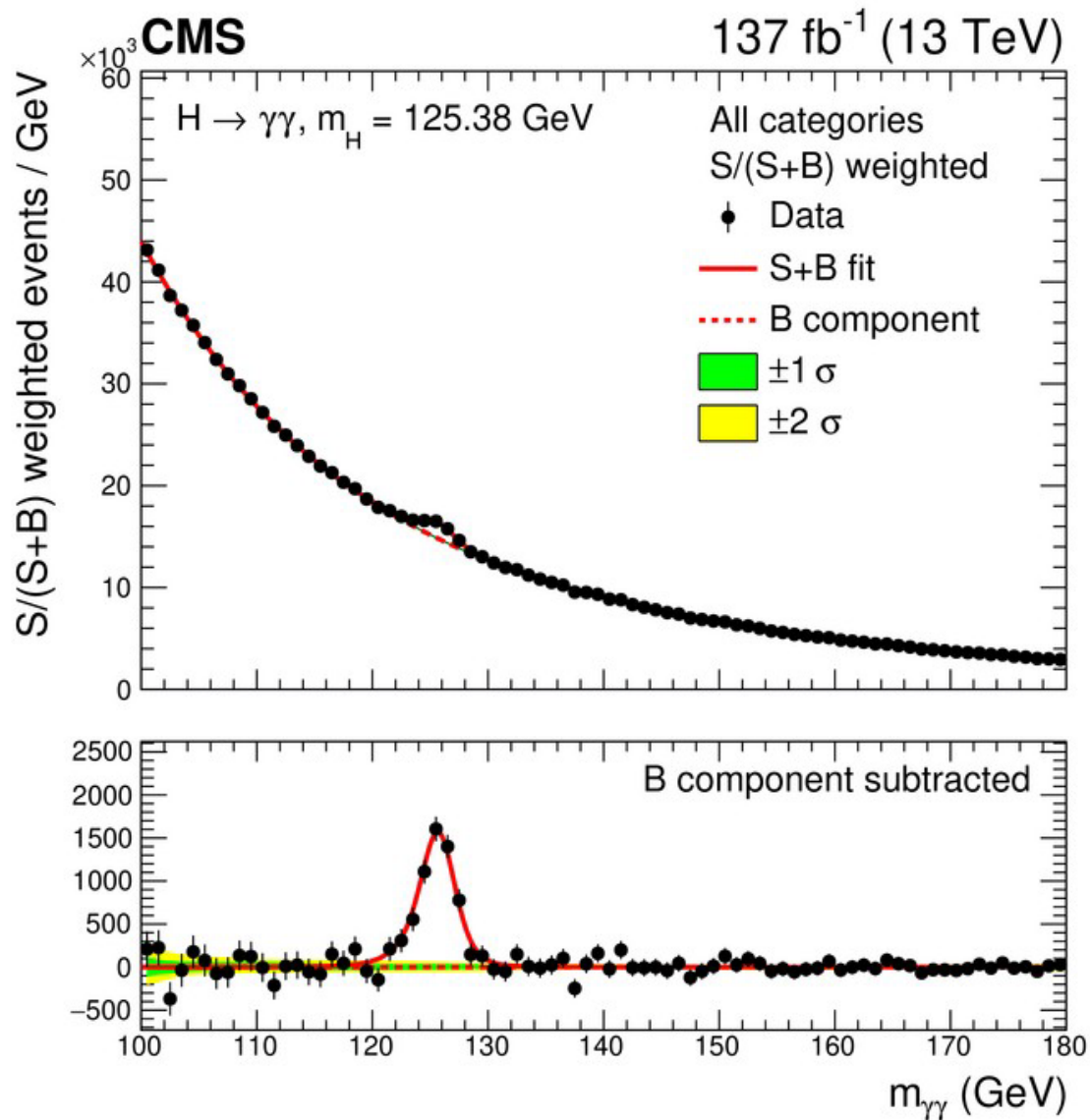
$H \rightarrow Z\gamma$ 0.155 ± 0.014

$H \rightarrow \mu\mu$ 0.022 ± 0.001

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

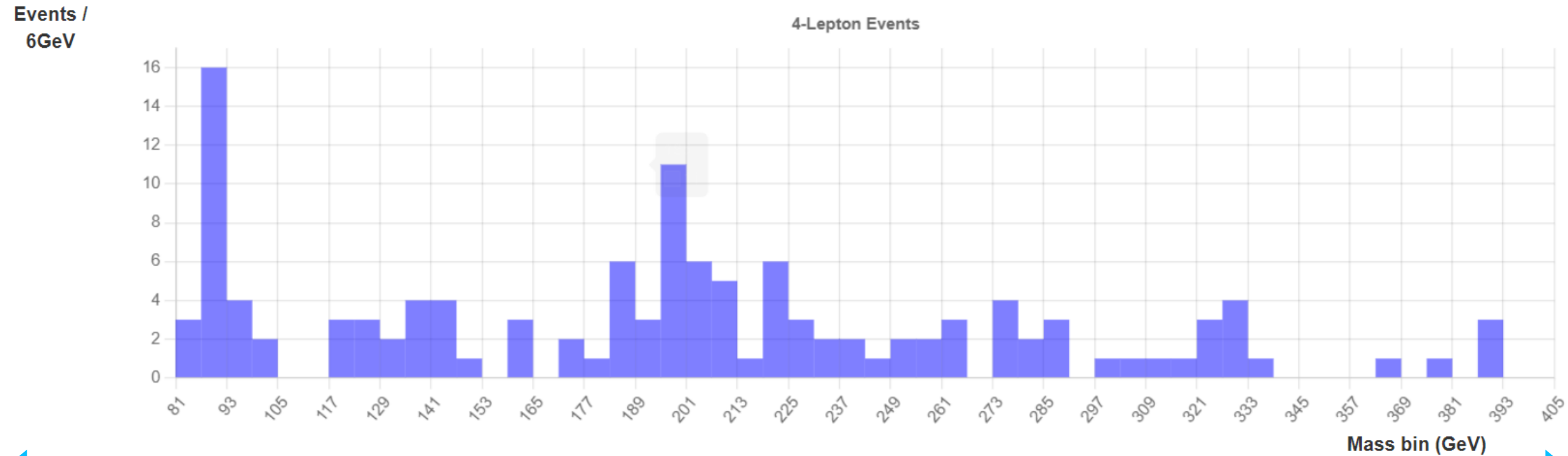


Dati 2015-2018: $H \rightarrow \gamma\gamma \dots H \rightarrow ZZ$



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

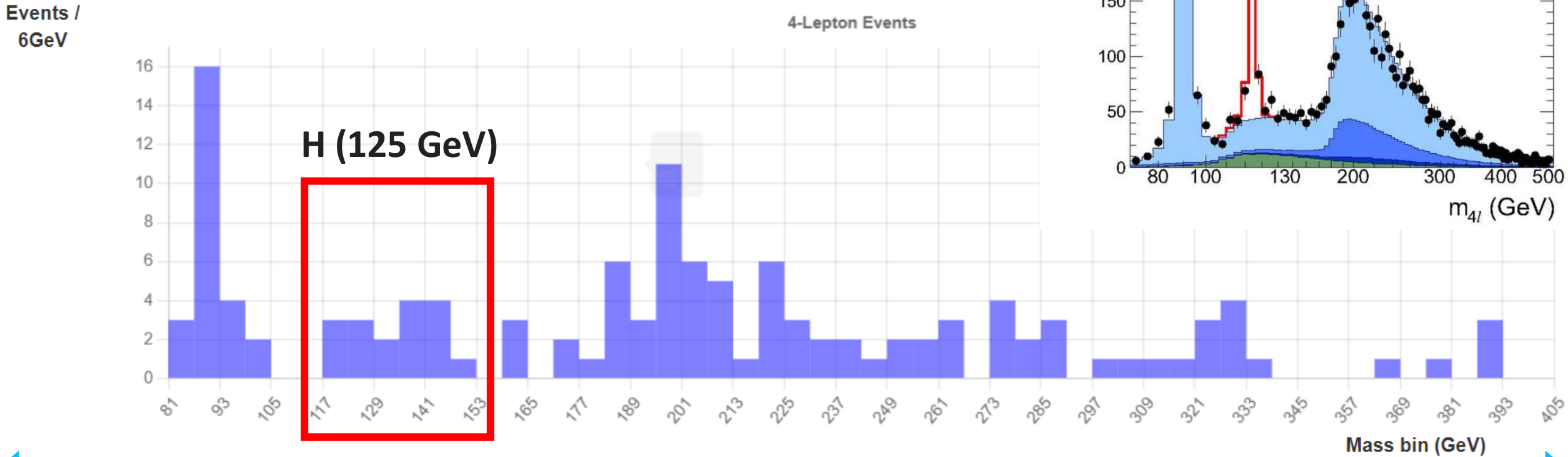
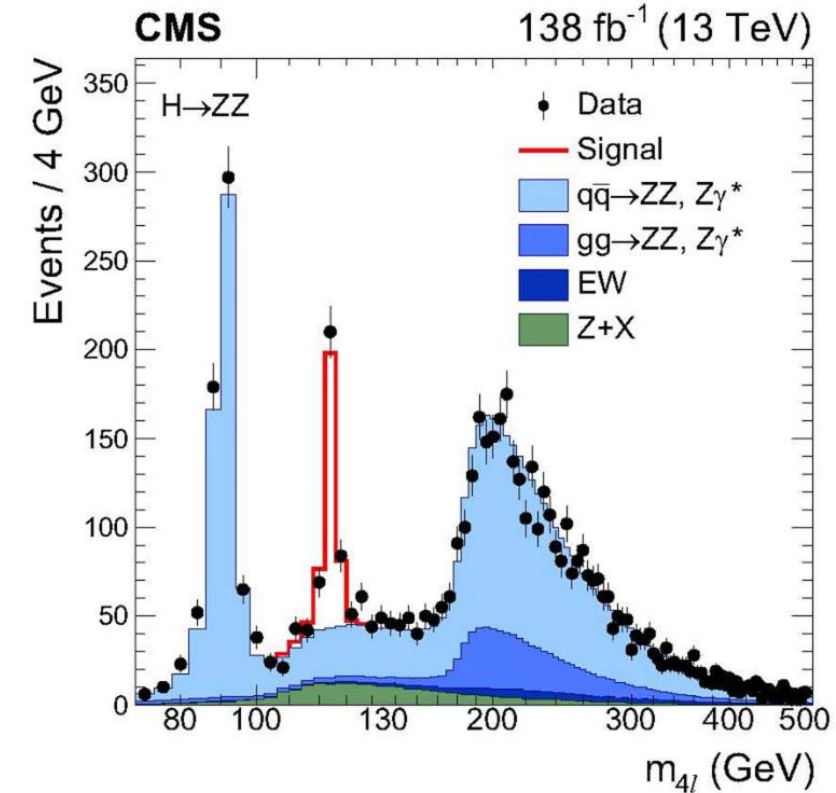
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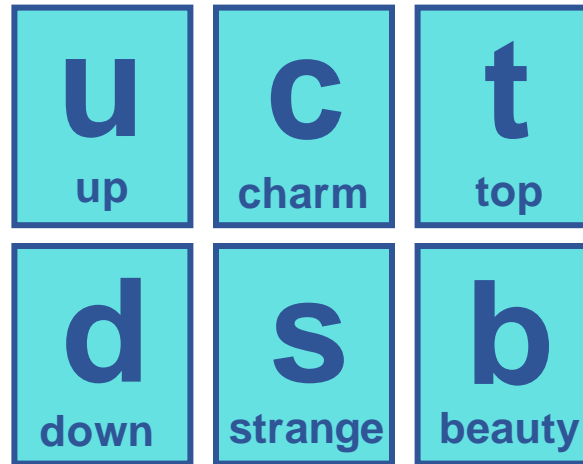
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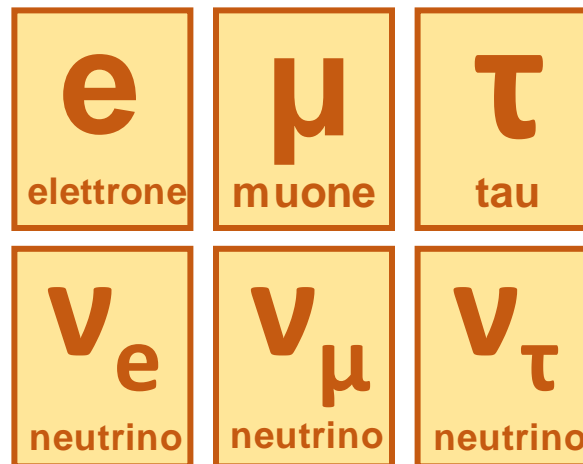


Fisica: Modello Standard

Quark



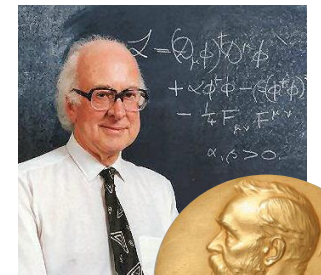
Leptoni

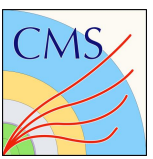


Bosoni



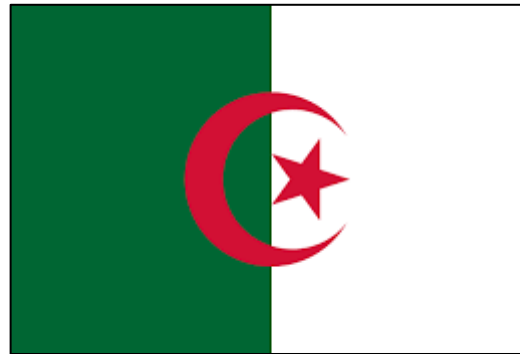
Higgs





Video conferenza ore 16:00

- Ci collegheremo con il CERN!
- Ci saranno 2 moderatori:
 - Andrea Massironi (Milano, Italia)
 - Roumyana Hadjiiska (Sofia, Bulgaria)
- Parteciperanno anche altri 4 istituti!
 - [Constantine \(Algeria\)](#)
 - [Kharkiv \(Ucraina\)](#)
 - [Helsinki \(Finlandia\)](#)
 - [Santiago de Compostela \(Spagna\)](#)



Risultati: numeri e frequenze

- Domande:

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

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

e elettrone	μ muone	τ tau
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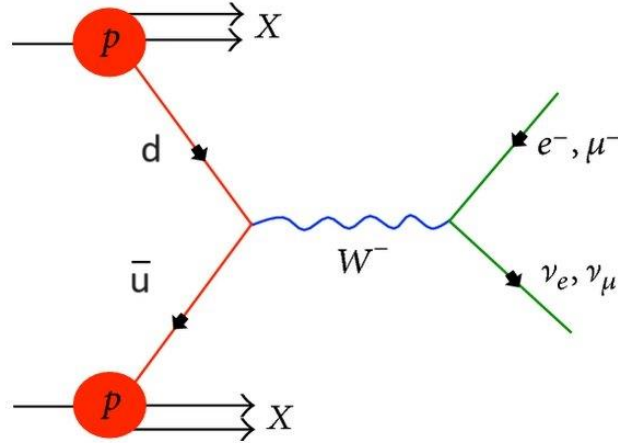
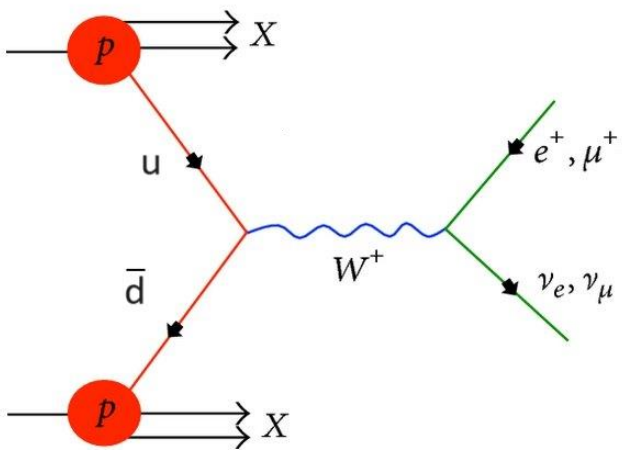
Risultati: numeri e frequenze

- Domande:

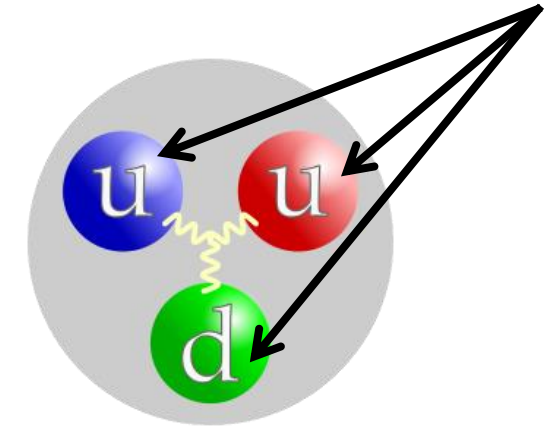
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- Rapporto tra W^+/W^- : 1.3

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Protone Quark



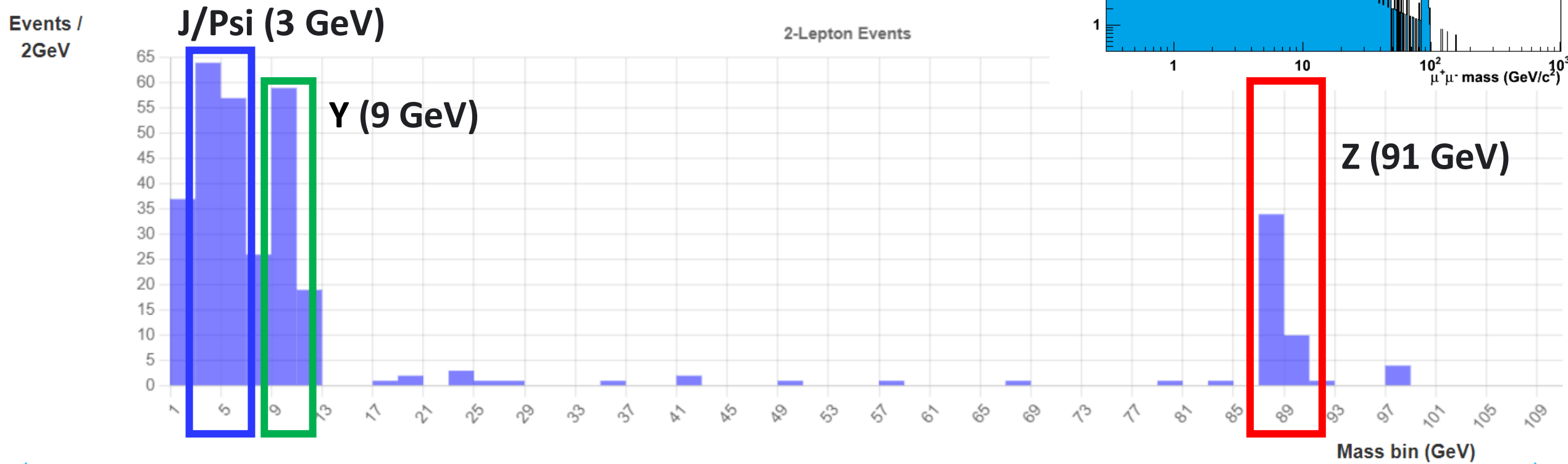
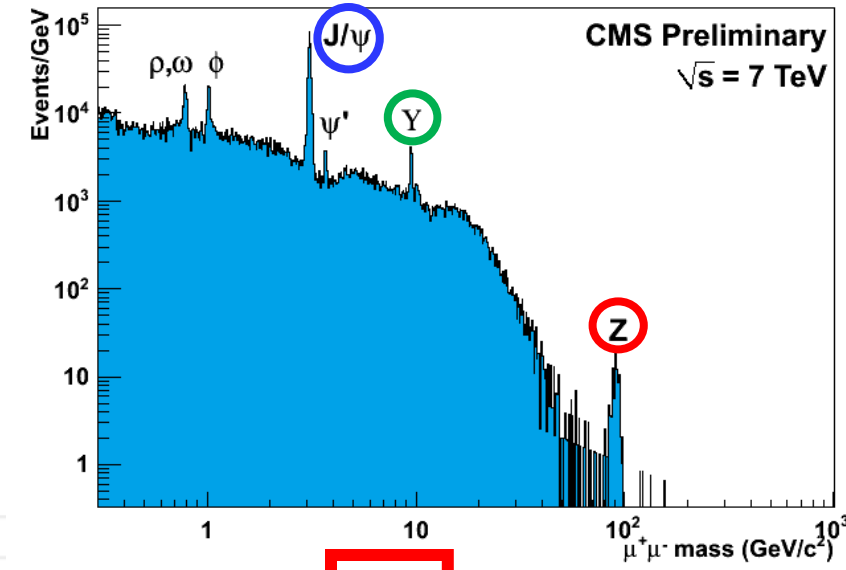
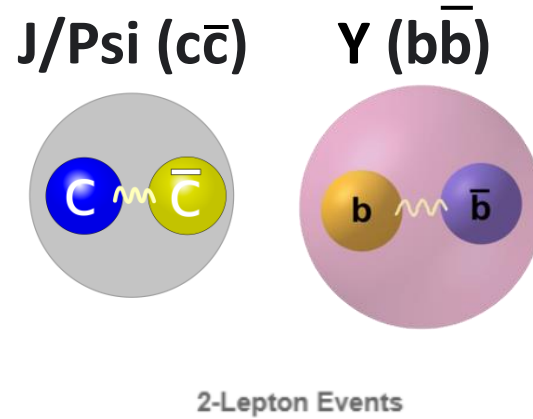
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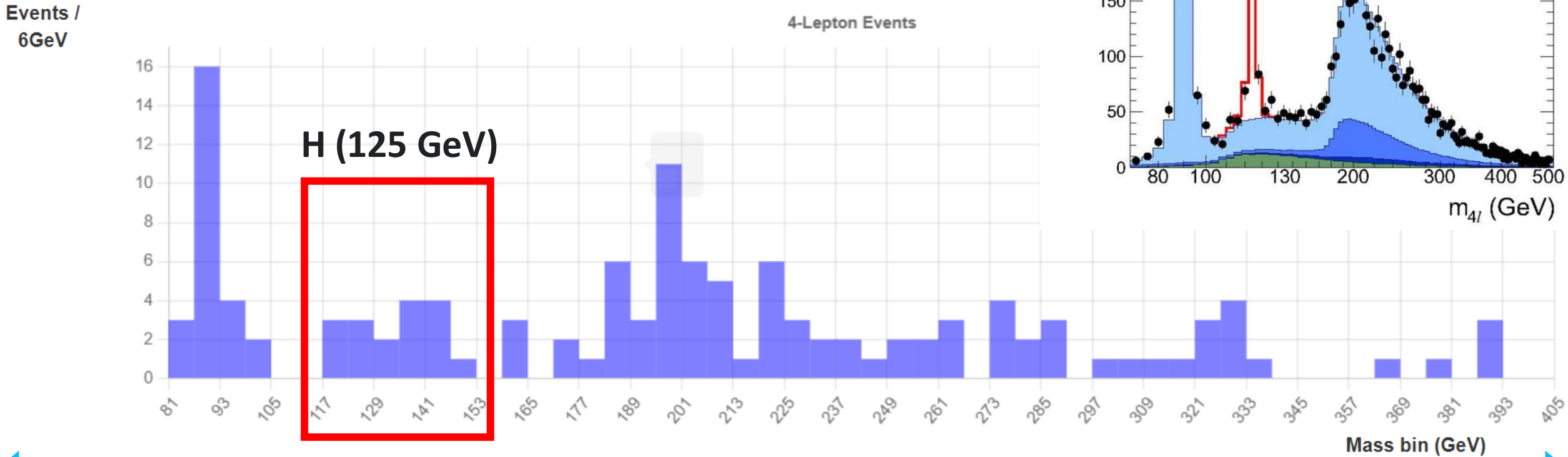
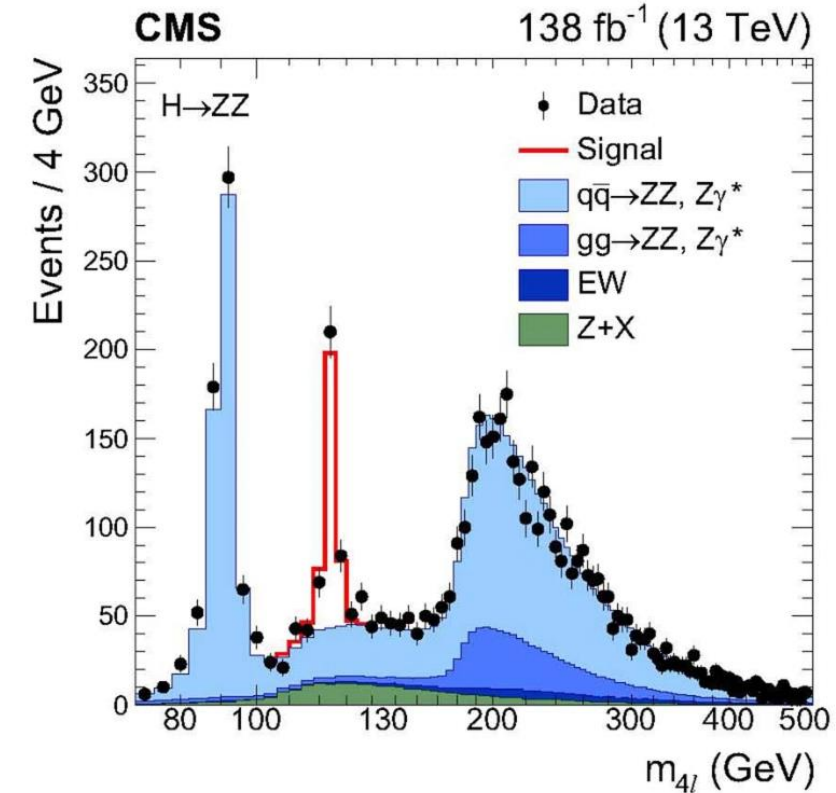
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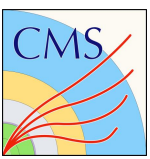


Risultati: istogramma di massa ($H \rightarrow ZZ$)

- Domande:

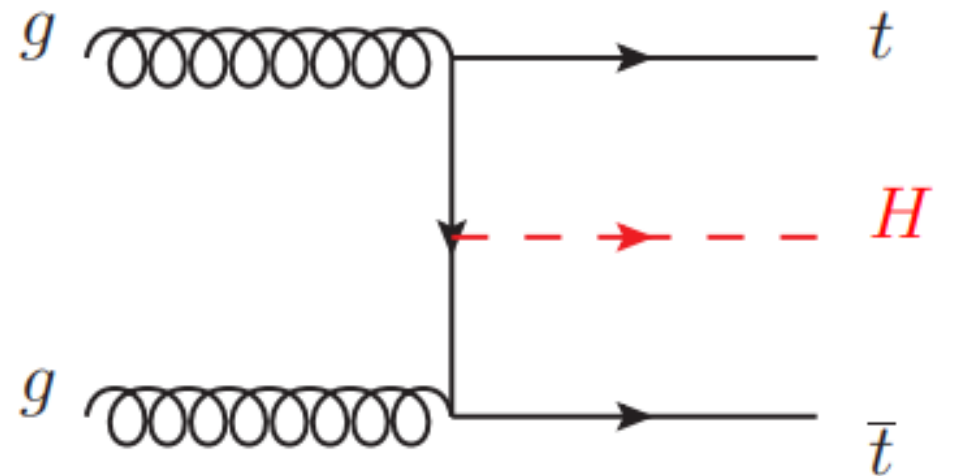
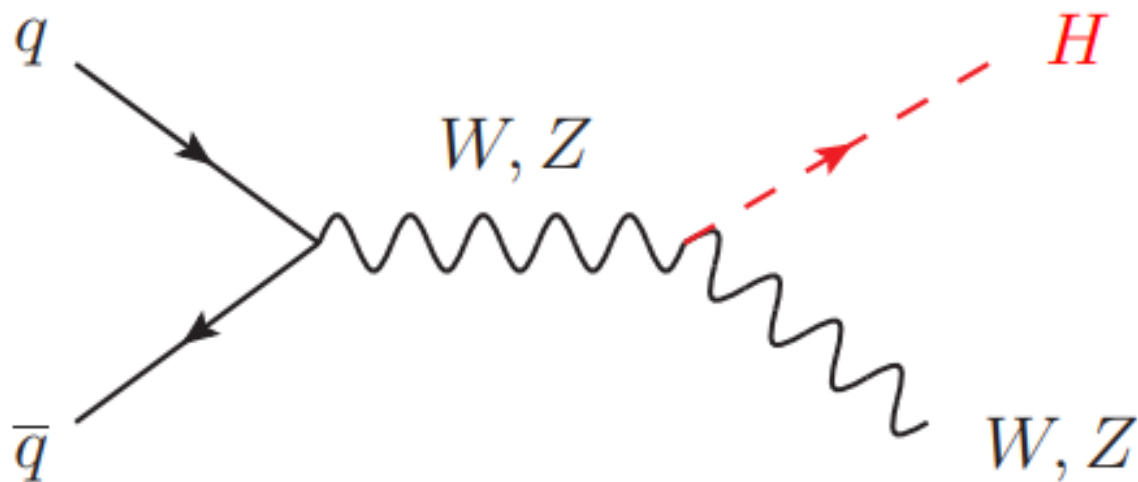
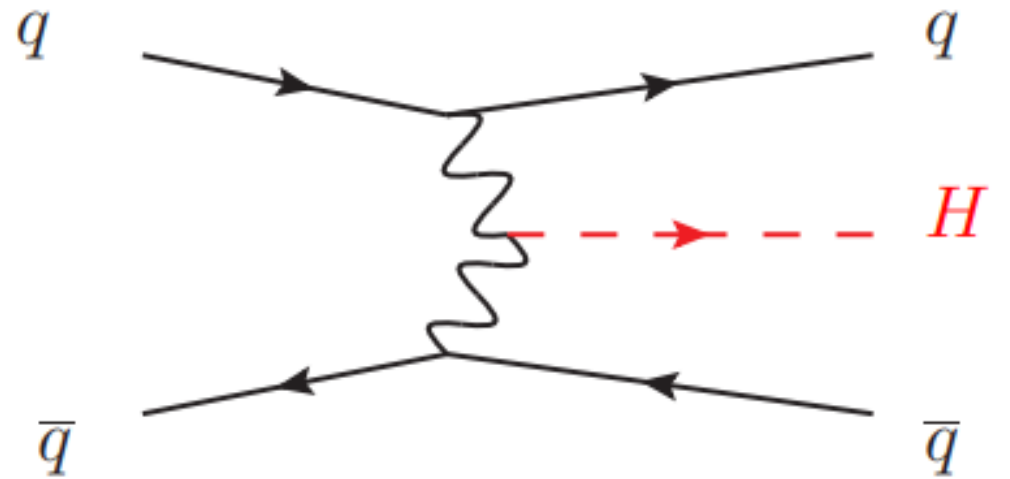
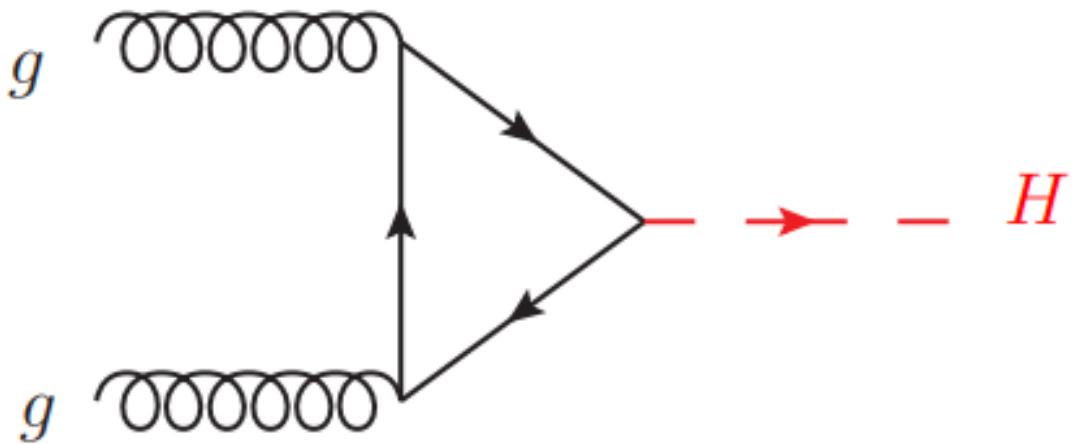
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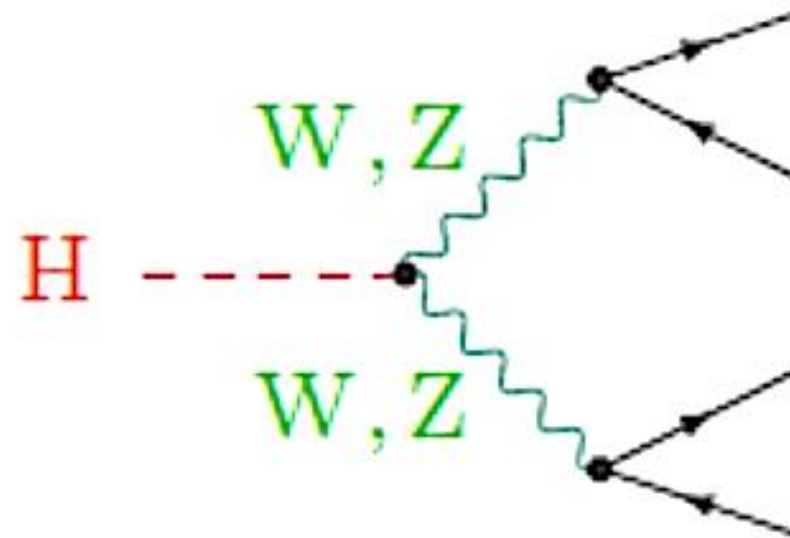
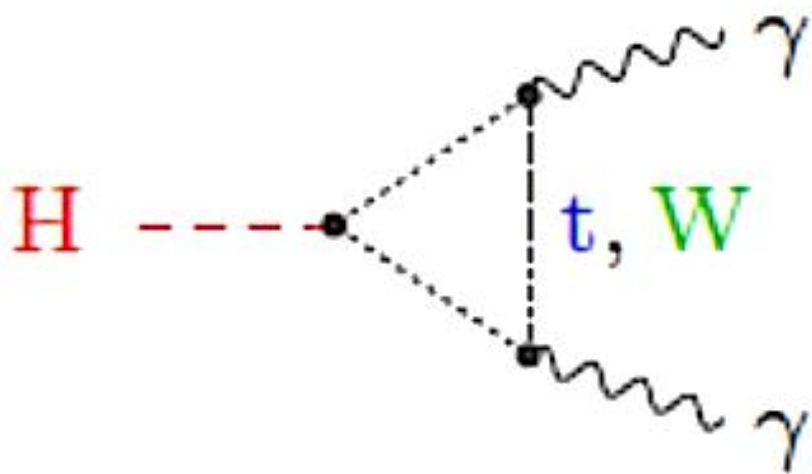
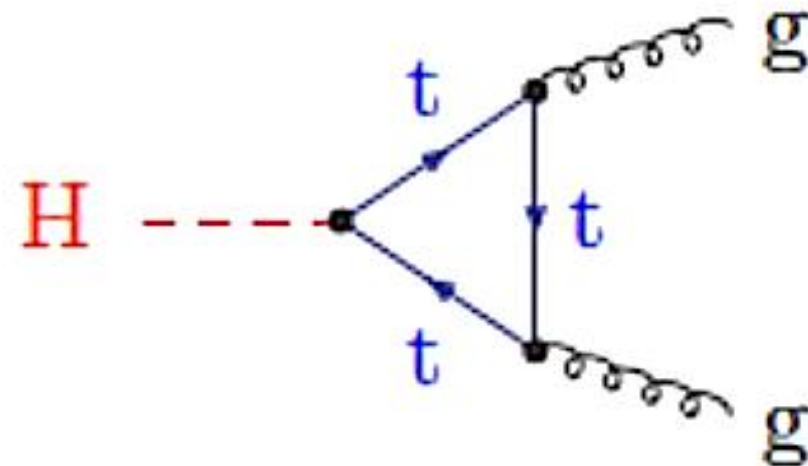
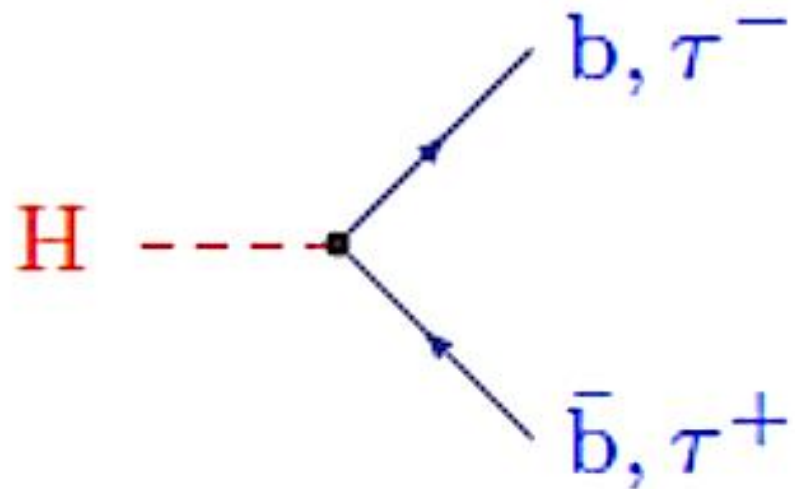


Backup

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

