



**INTERNATIONAL  
MASTERCLASSES**

hands on particle physics



**SAPIENZA**  
UNIVERSITÀ DI ROMA



**INTERNATIONAL  
MASTERCLASSES**

hands on particle physics

Giovanni Organtini

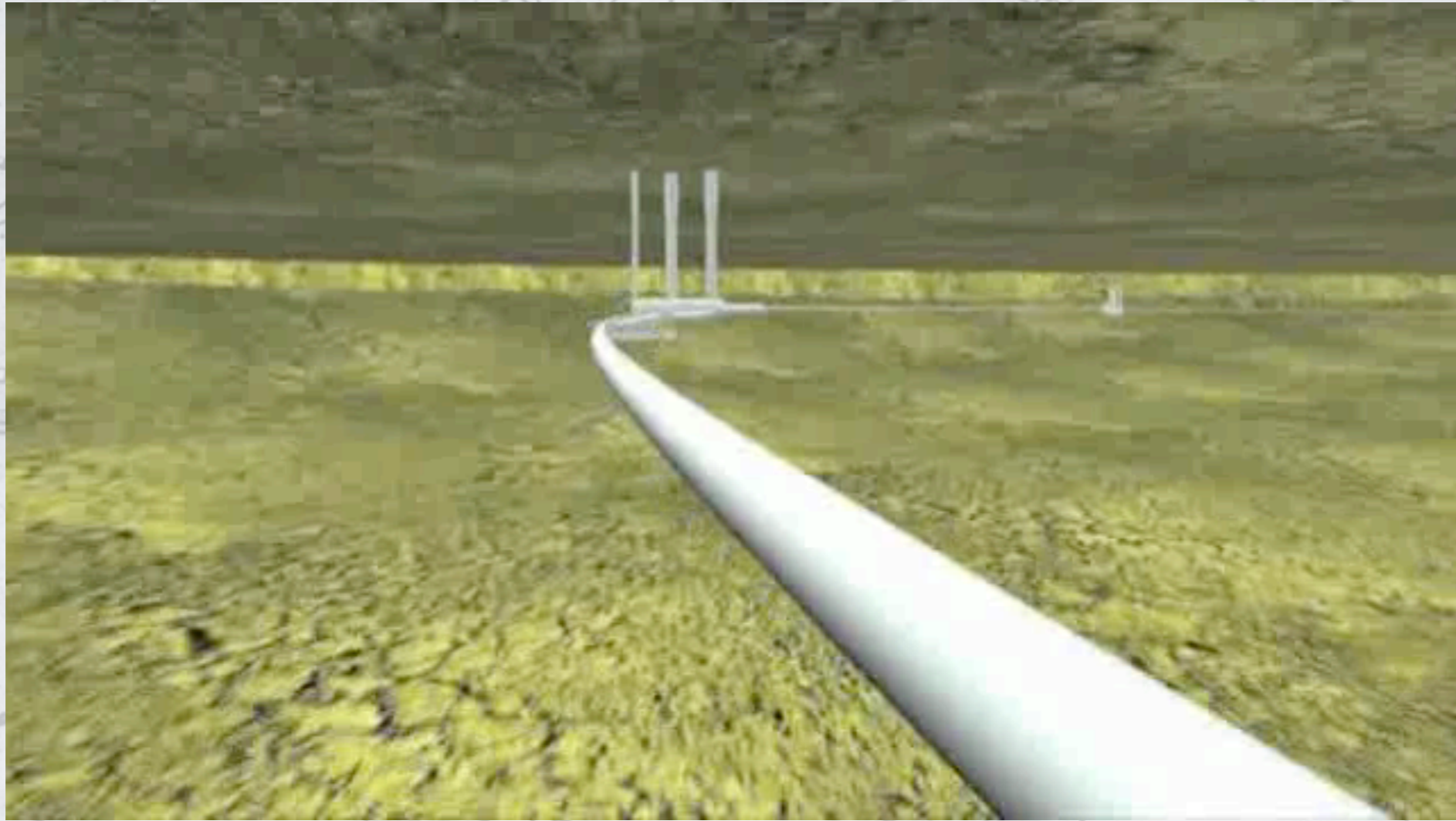
Dip. di Fisica "Sapienza", Università di Roma & INFN-Sez. di Roma



CMS Experiment at LHC, CERN  
Data recorded: Mon Sep 26 20:18:07 2011 C-S1  
Run/Event: 177201 625786854

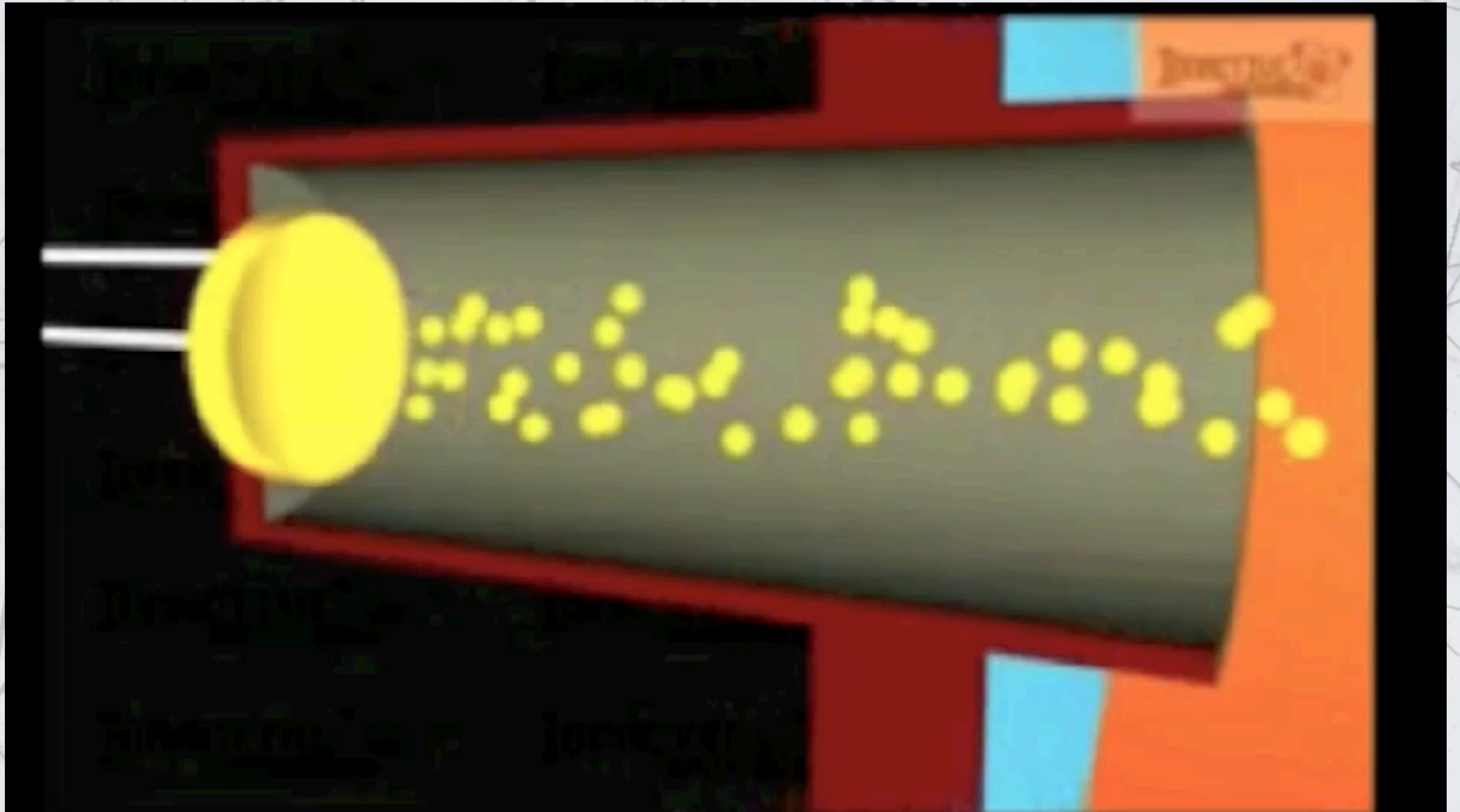
# COME SI PRODUCONO LE PARTICELLE

# ELmc2



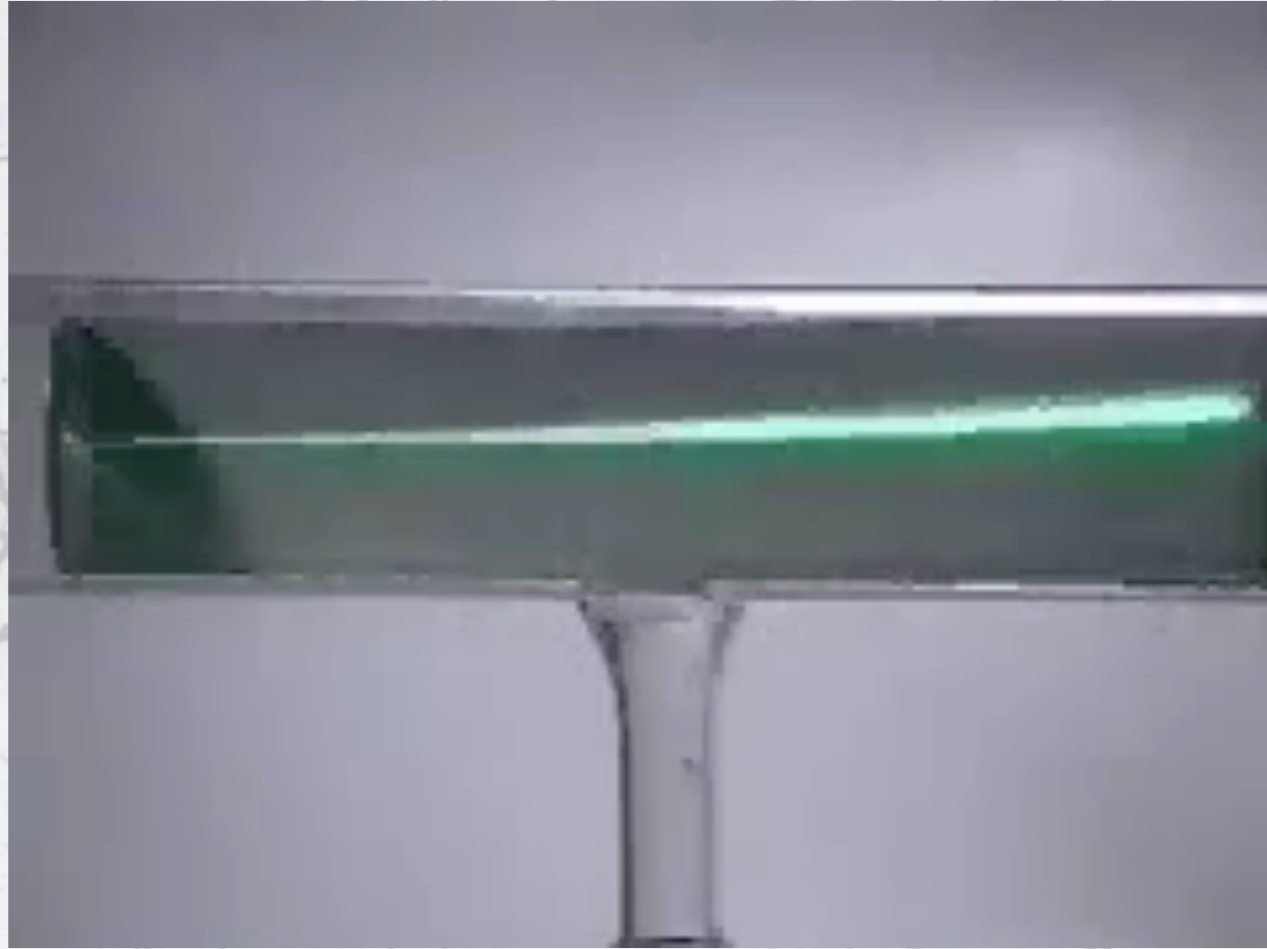


# ACCELERARE LE PARTICELLE

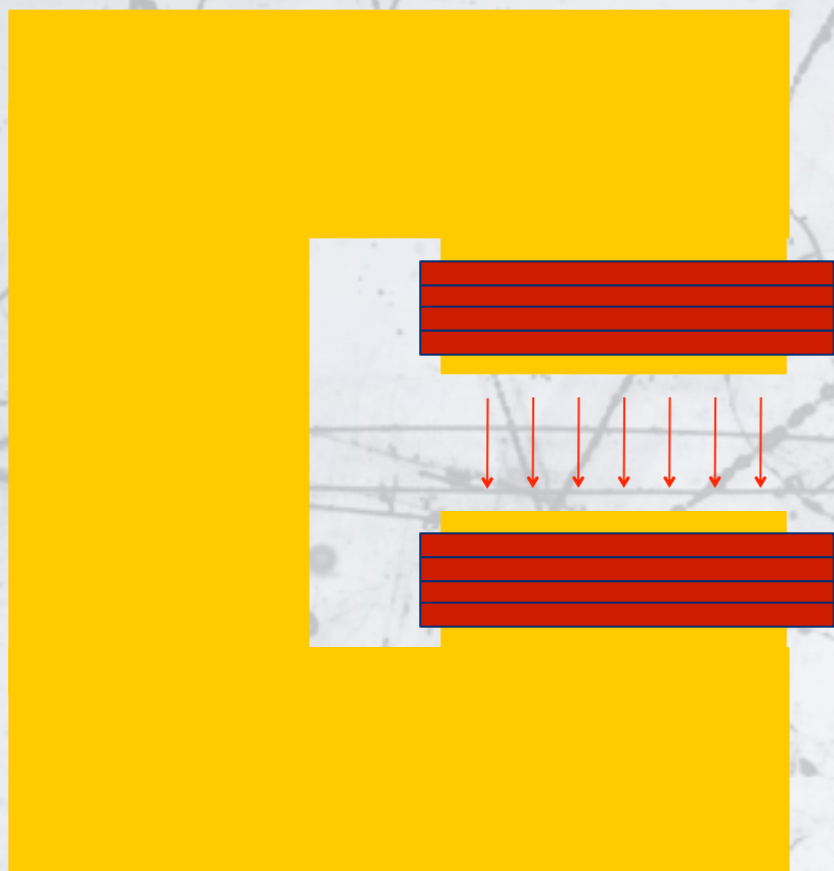


Giovanni Organtini - Sapienza Università di Roma & INFN-Sez. di Roma



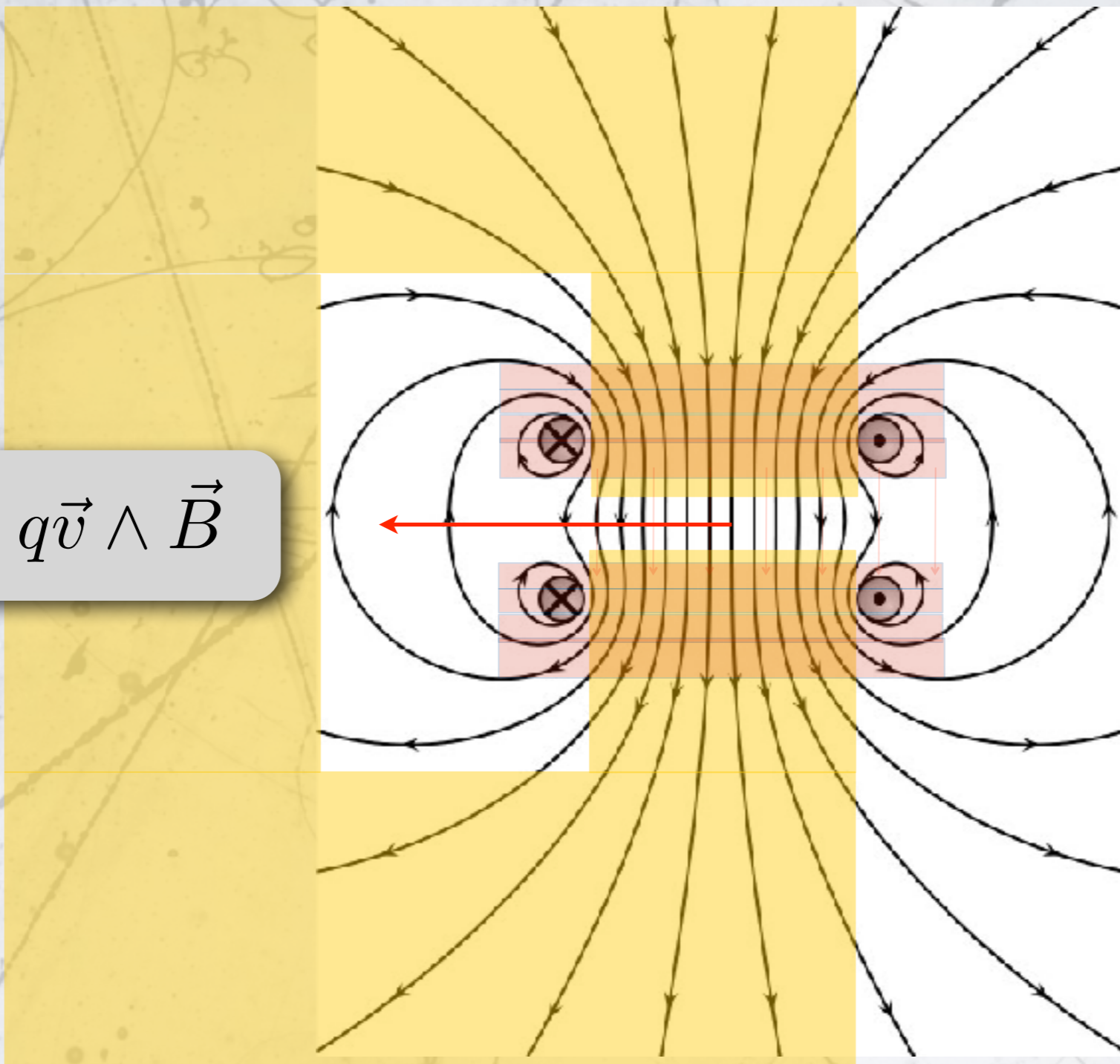


# GUIDA

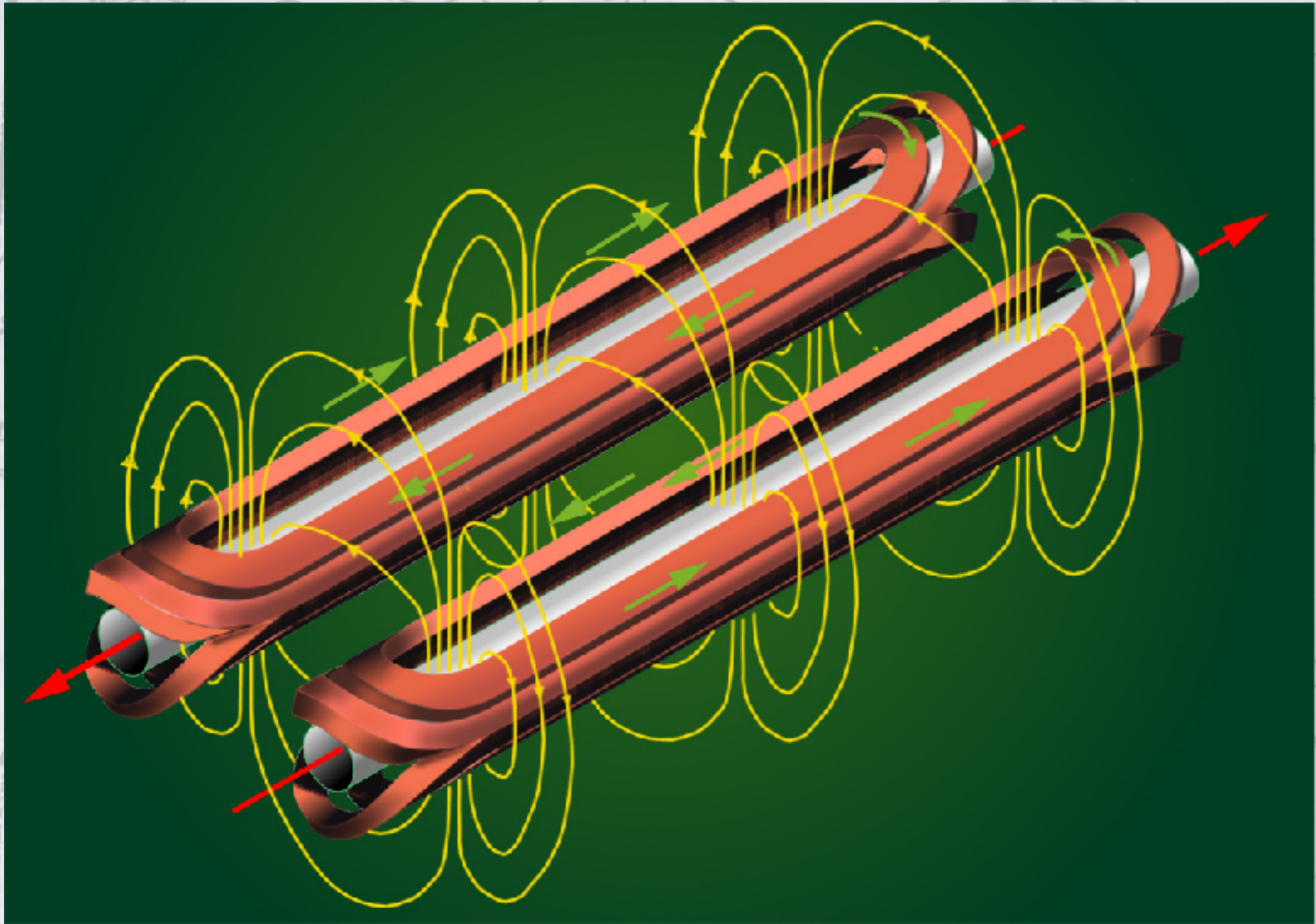


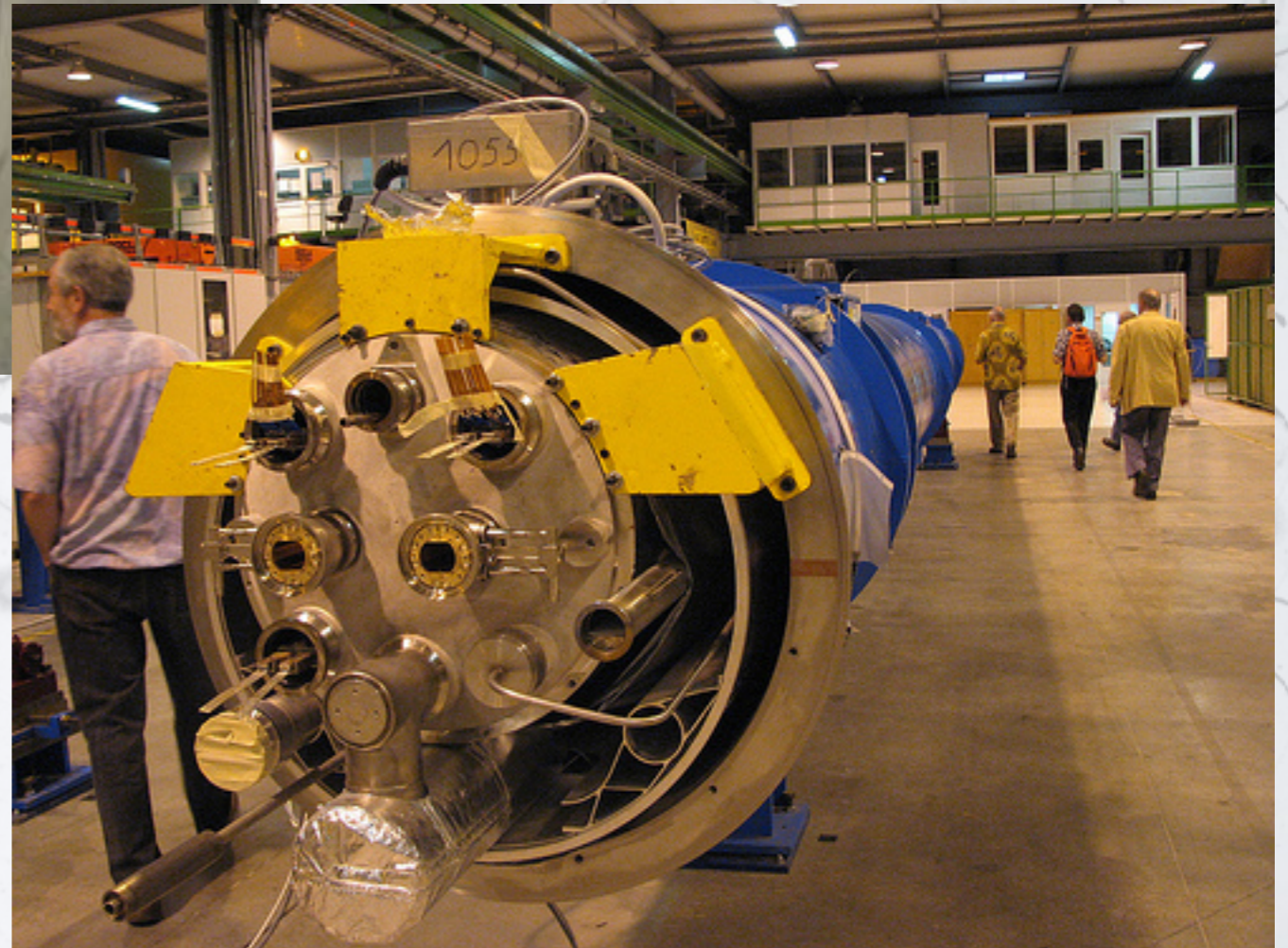
# MAGNETI DEFLETTORI

$$\vec{F} = q\vec{v} \wedge \vec{B}$$



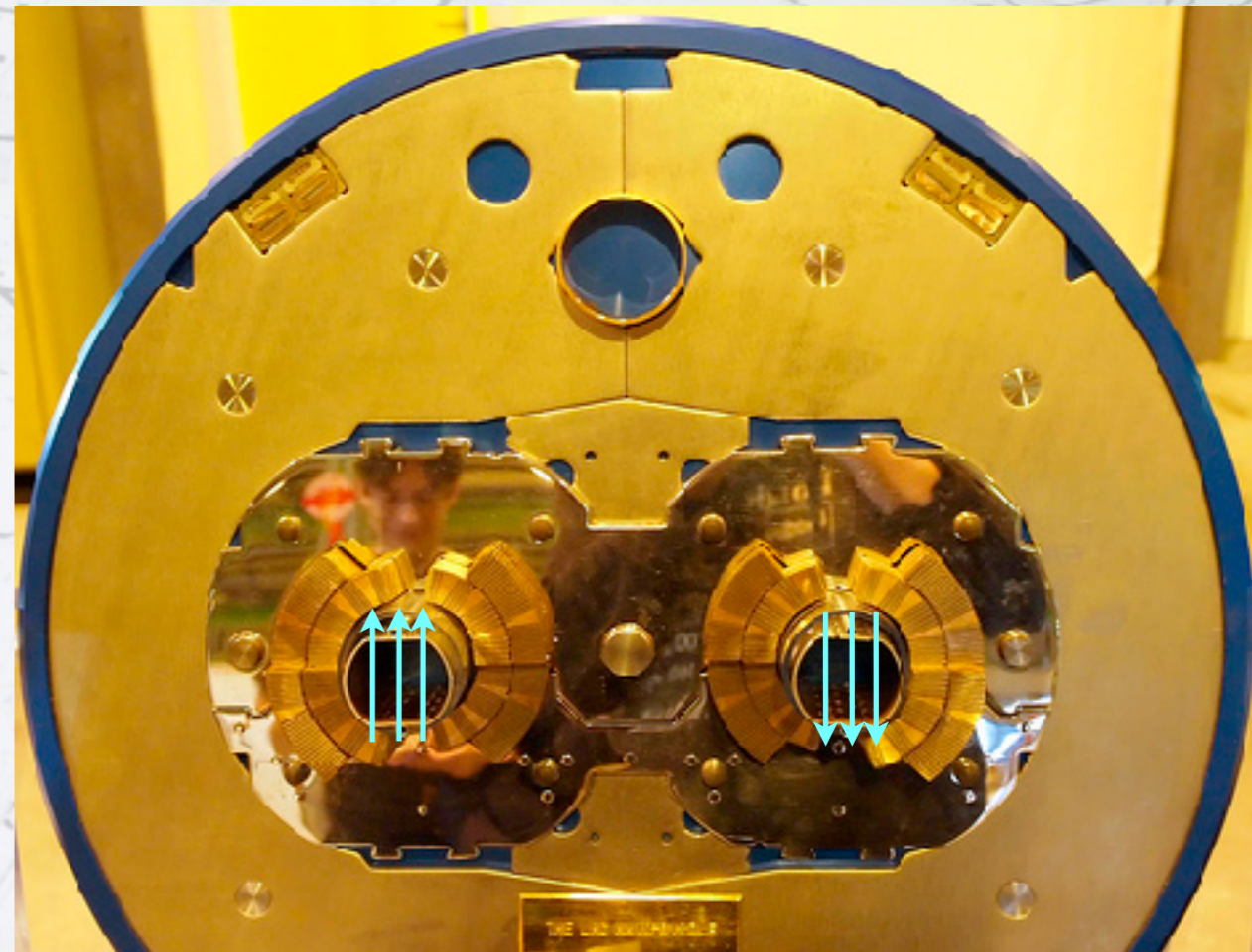
$$\vec{B} = \mu_0 n I \hat{z}$$

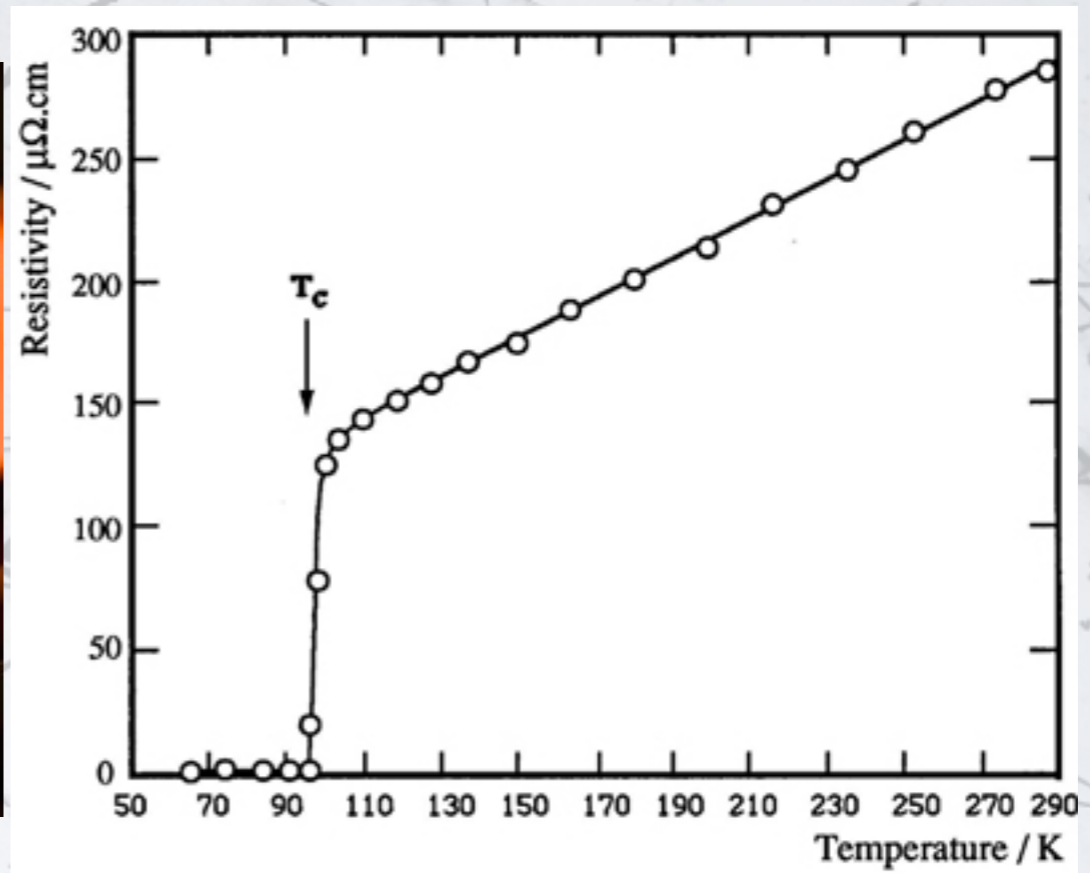


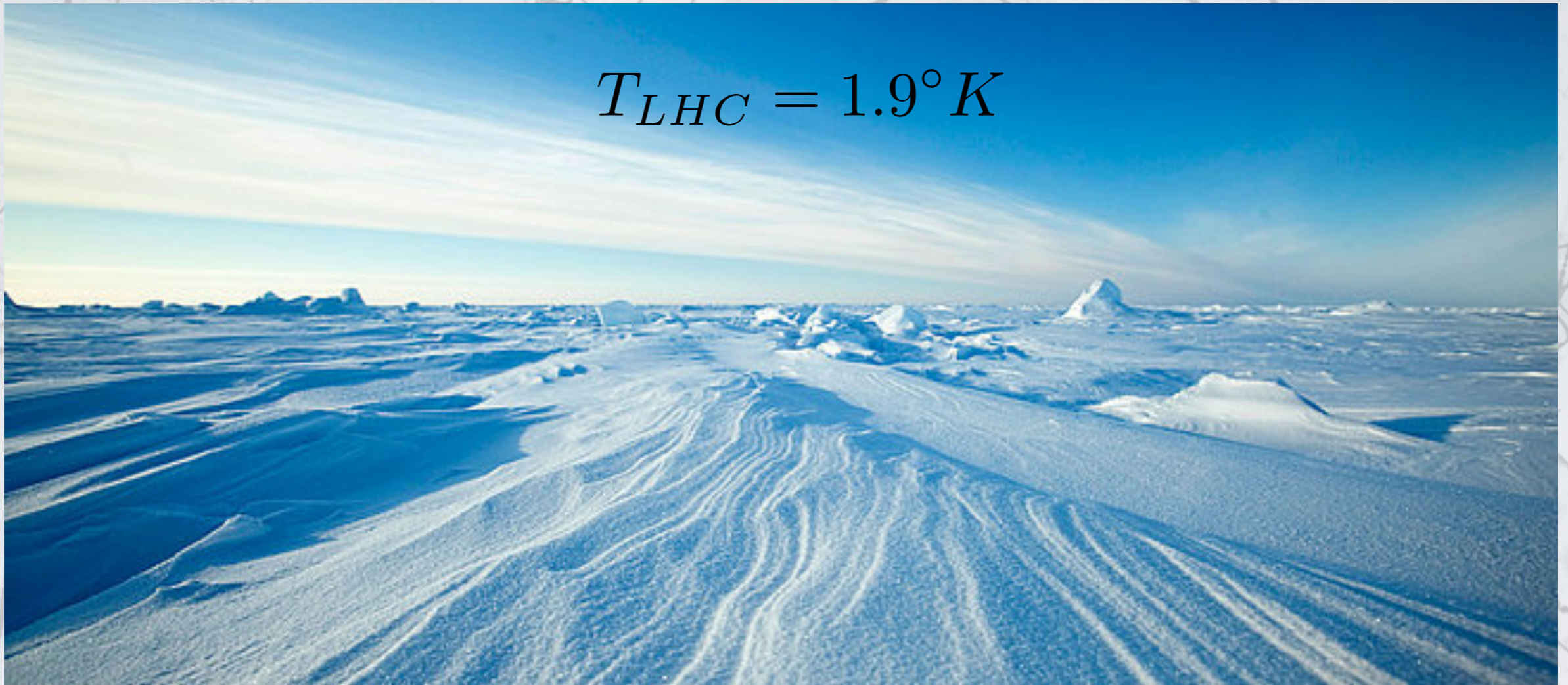




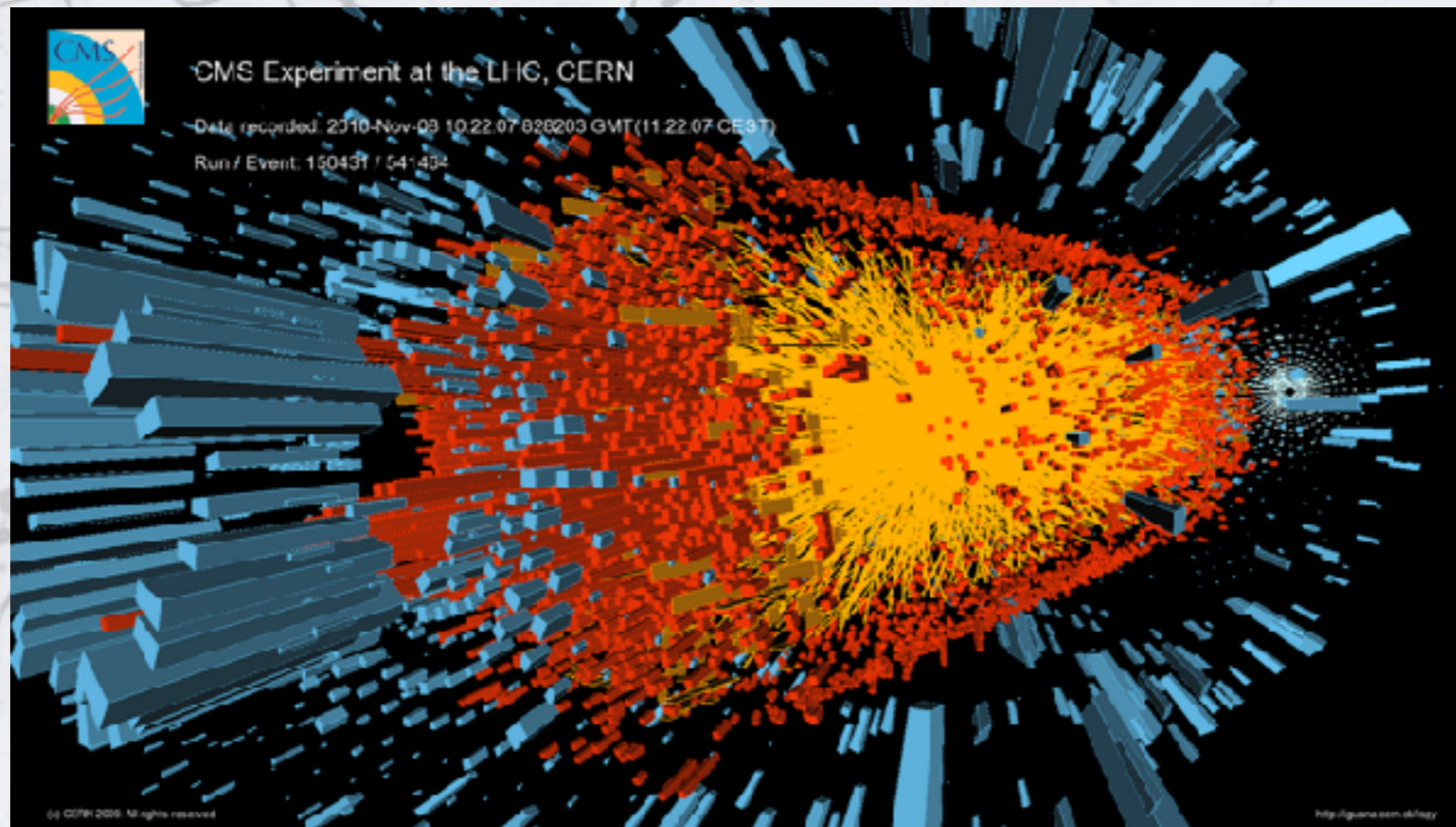
- 1232 dipoli magnetici
- $B = 8.33\text{ T}$  (100.000 volte più intenso di quello terrestre)
- $I = 12000\text{ A}$  (utenze domestiche:  $\sim 13\text{ A}$ )
- lunghezza del dipolo: 4.3 m
- 1 miliardo di km di cavo







$$T_{\text{Coll}} > 1000000 T_{\text{Sun}}$$



LHC Page1

Fill: 3005

E: 4000 GeV

t(SB): 01:42:50

26-08-12 10:47:18

# PROTON PHYSICS: STABLE BEAMS

Energy:

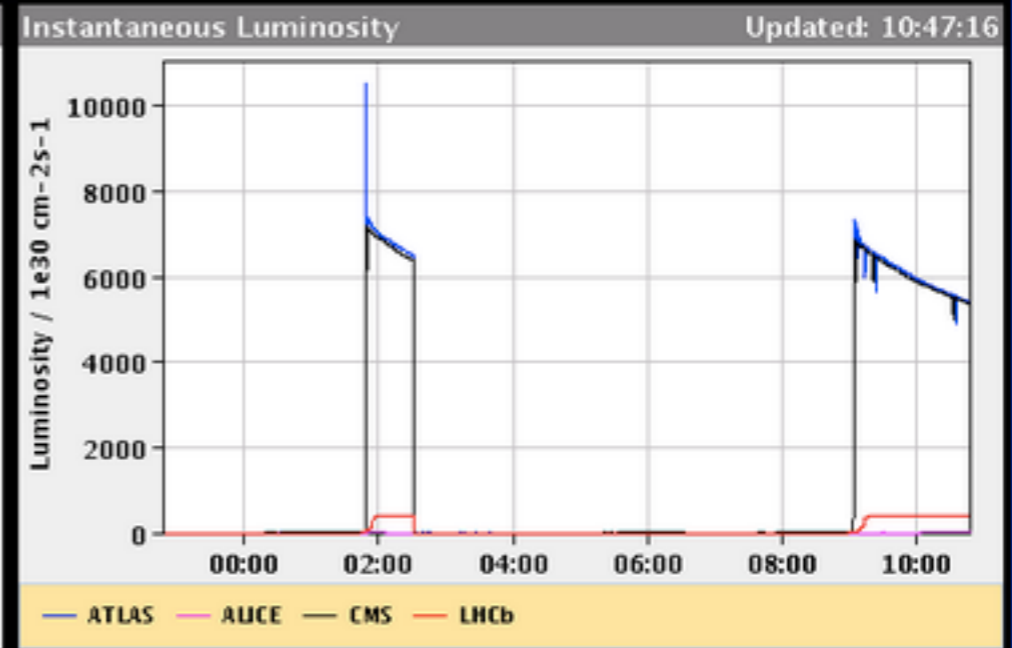
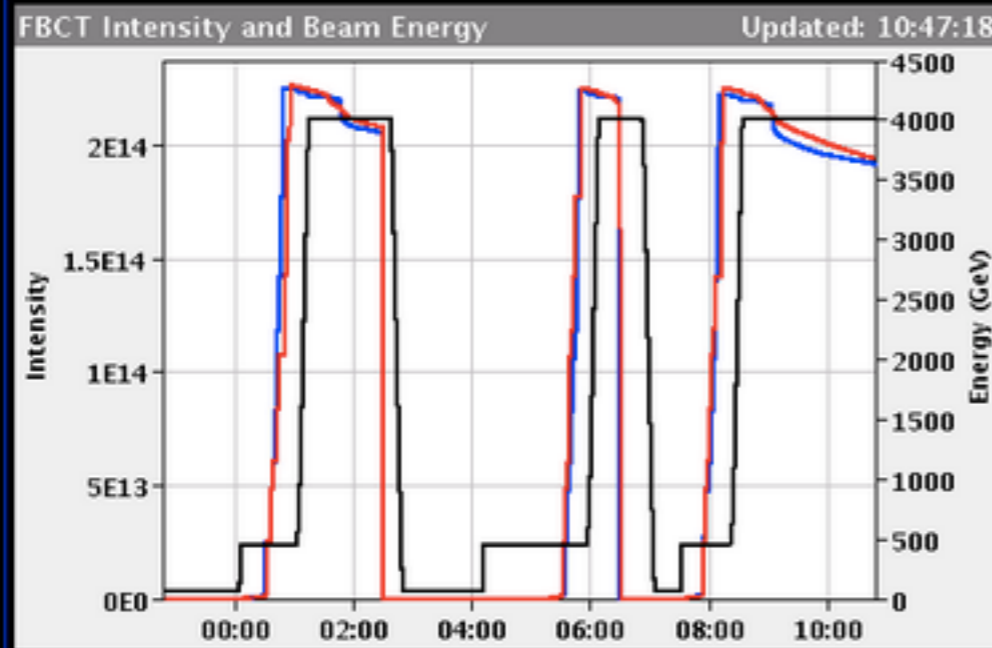
4000 GeV

I(B1):

1.95e+14

I(B2):

1.96e+14



Comments 26-08-2012 07:39:54 :

Filling for physics

BIS status and SMP flags

B1 B2

Link Status of Beam Permits	true	true
Global Beam Permit	true	true
Setup Beam	false	false
Beam Presence	true	true
Moveable Devices Allowed In	true	true
Stable Beams	true	true

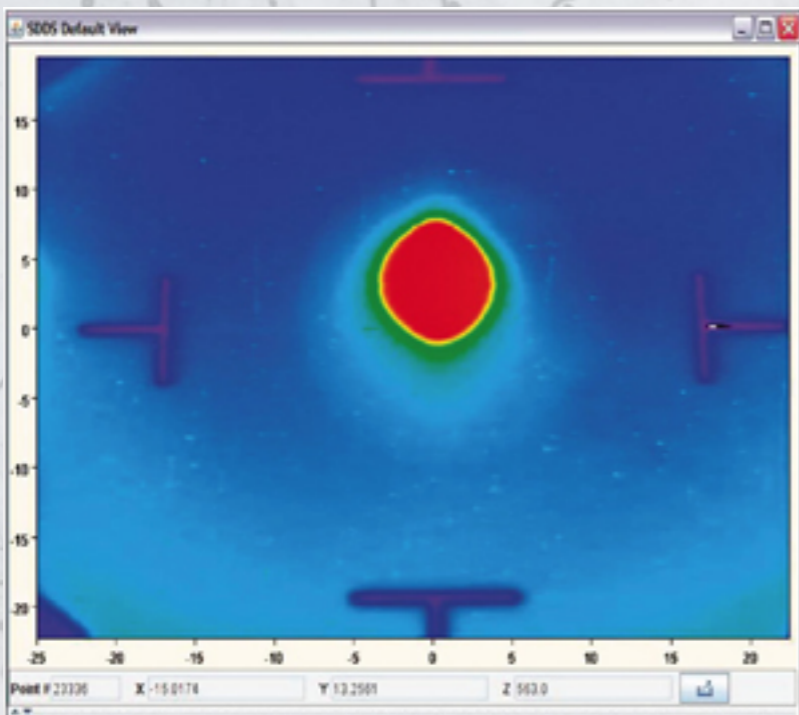
AFS: 50ns\_1374\_1368\_0\_1262\_144bpi12inj

PM Status B1

ENABLED

PM Status B2

ENABLED

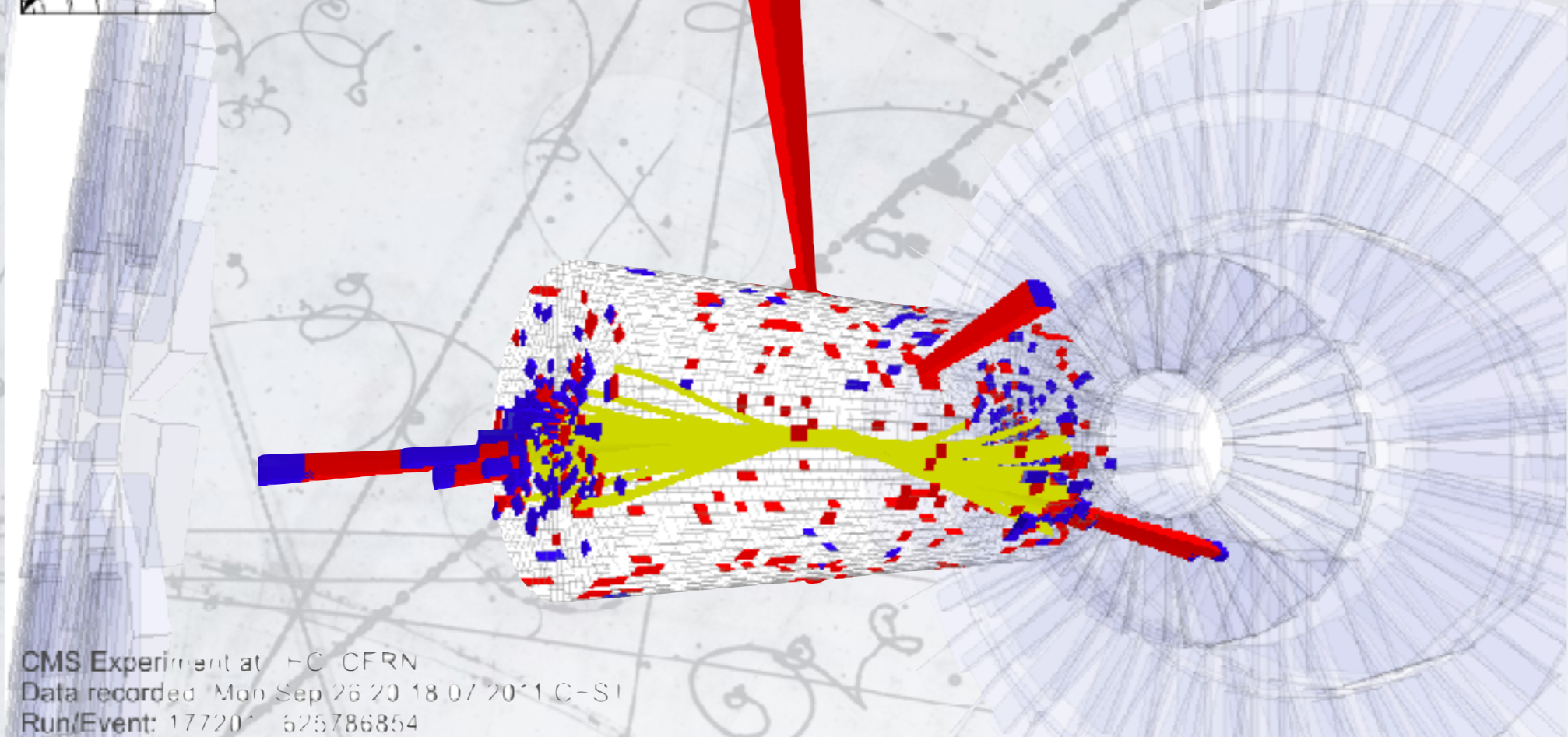
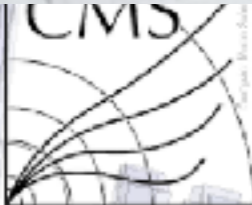


**$E_{LHC} = 360 \text{ MJ}$**



**$E_{FR} = 900 \text{ MJ}$**

2 motrici + 11 carrozze @ 200 km/h

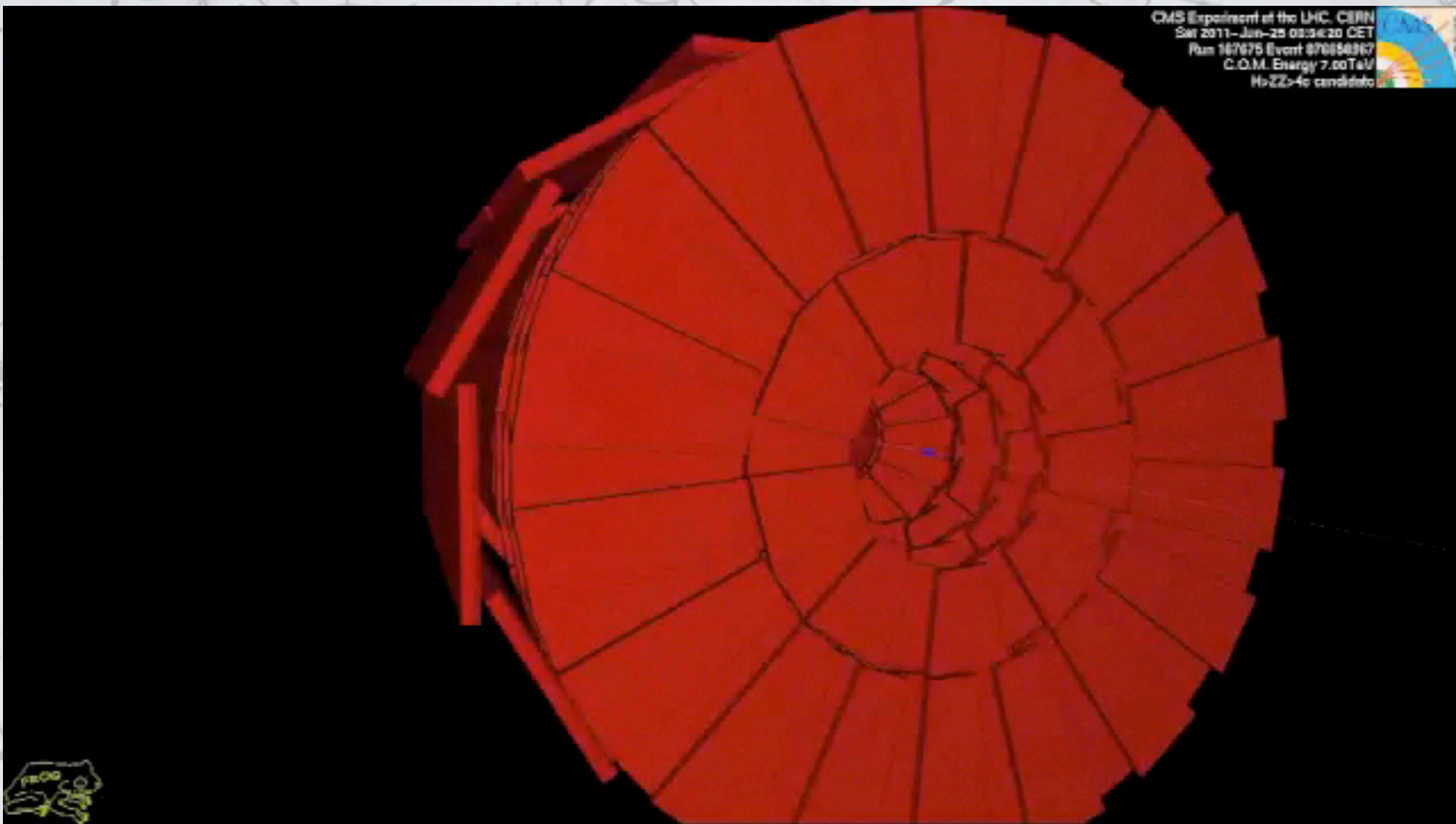


CMS Experiment at  $\sqrt{s} = 7$  TeV  
Data recorded: Mon Sep 26 20:18:07 2011 C-SI  
Run/Event: 177201 625786854

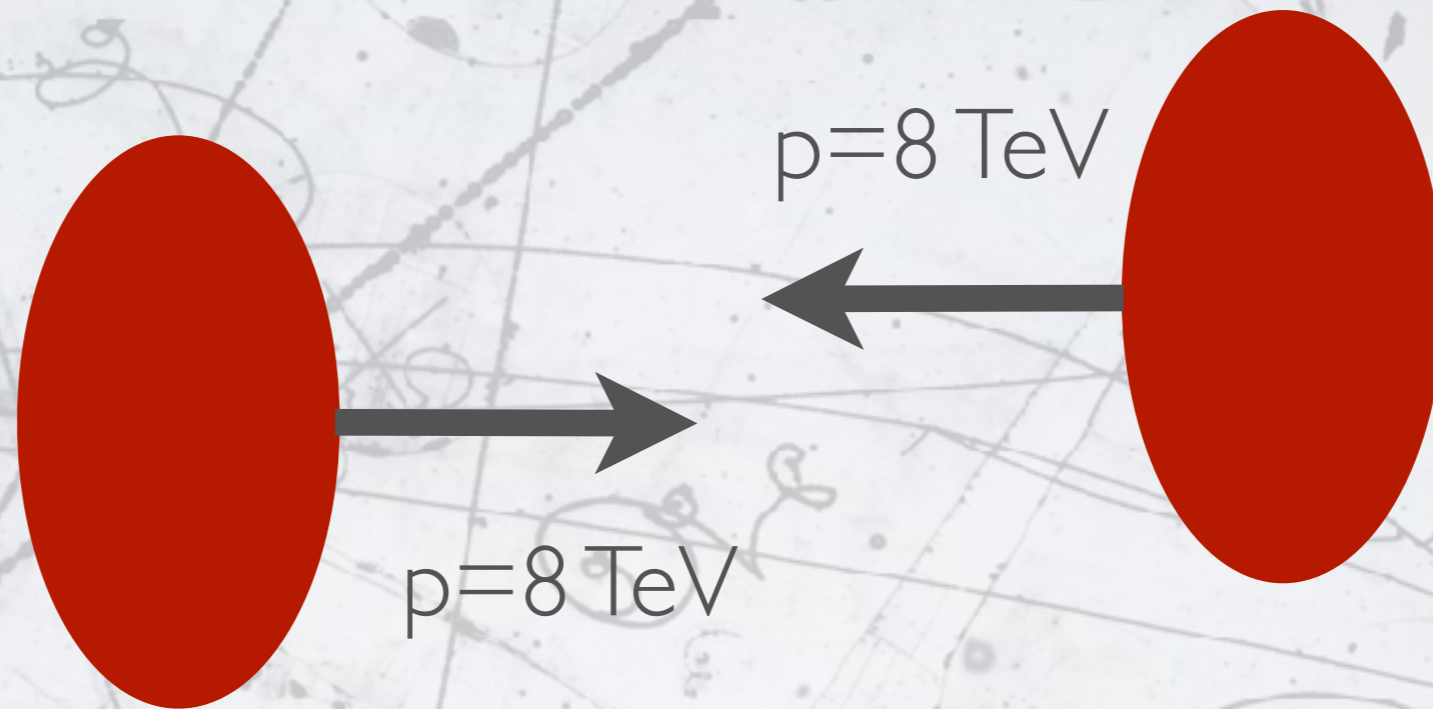
# OSSERVARE LE PARTICELLE



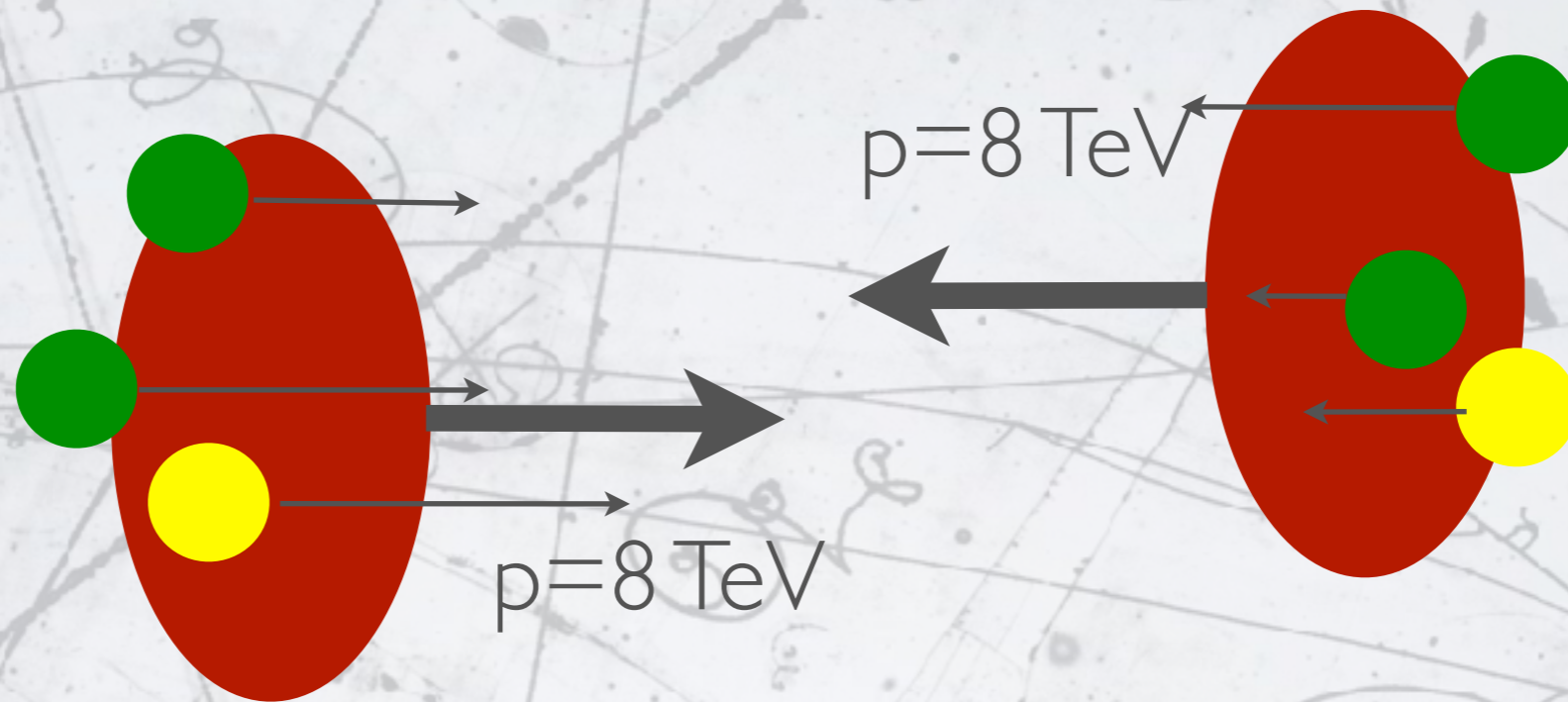
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# CINEMATICA



# CINEMATICA

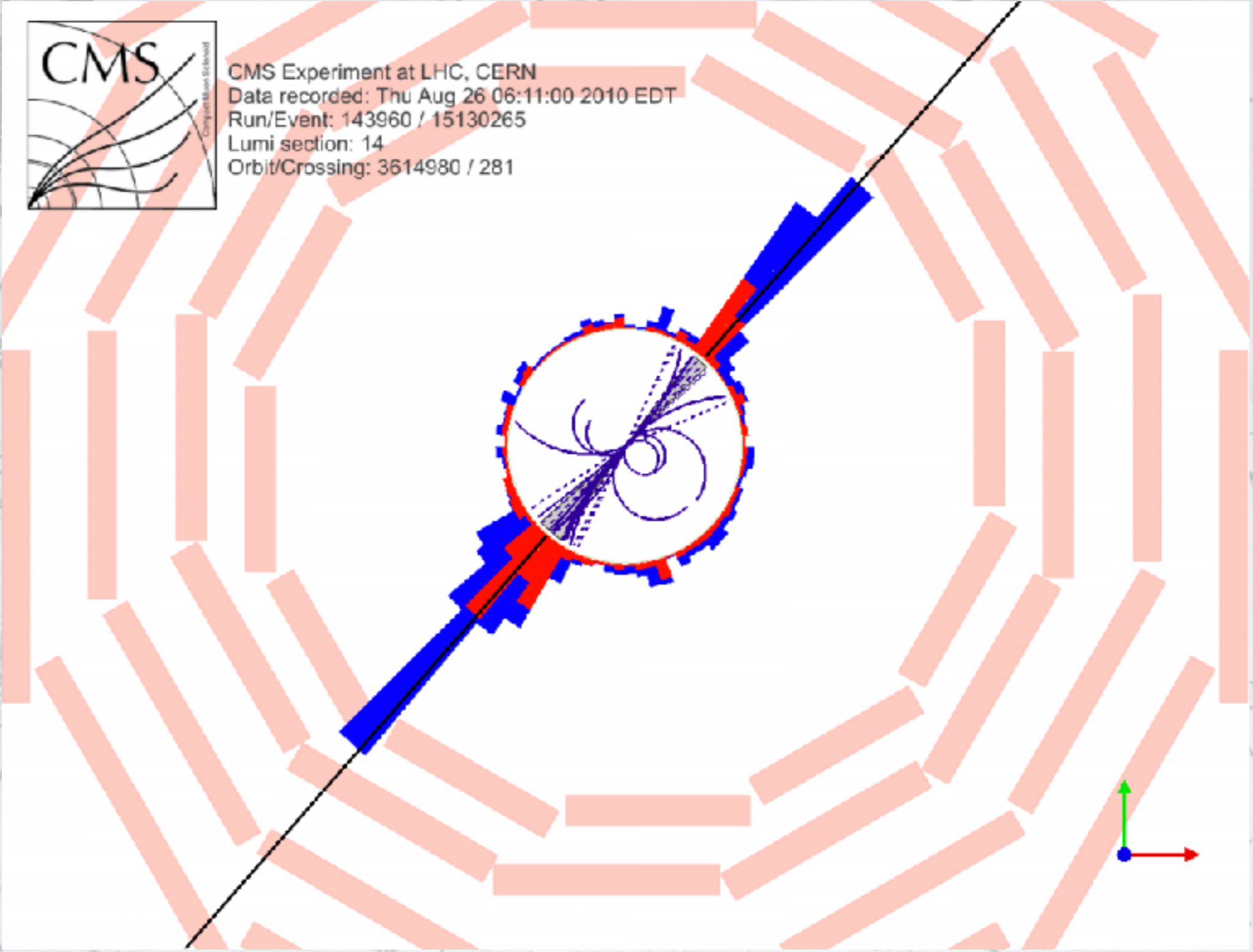


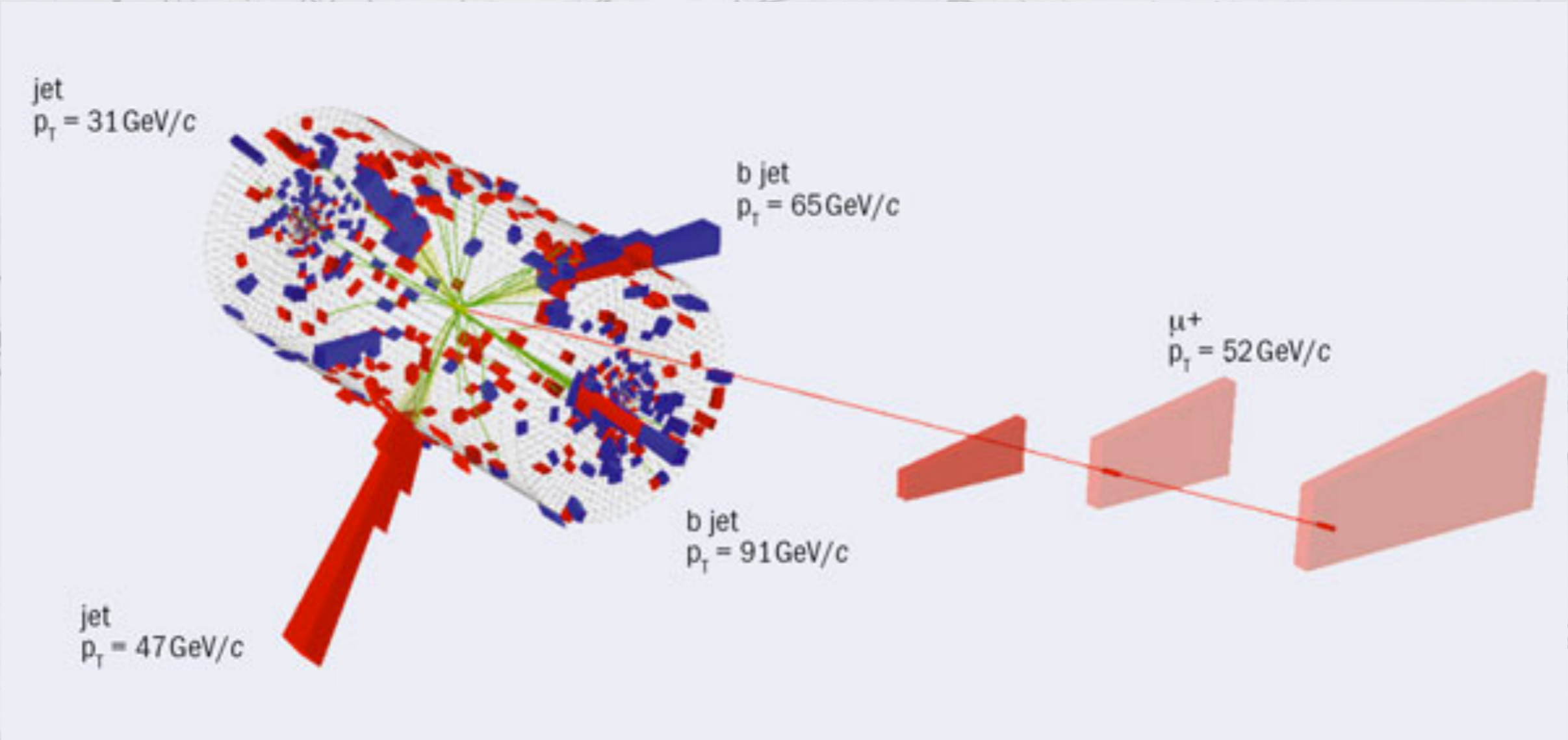
# CINEMATICA





CMS Experiment at LHC, CERN  
Data recorded: Thu Aug 26 06:11:00 2010 EDT  
Run/Event: 143960 / 15130265  
Lumi section: 14  
Orbit/Crossing: 3614980 / 281





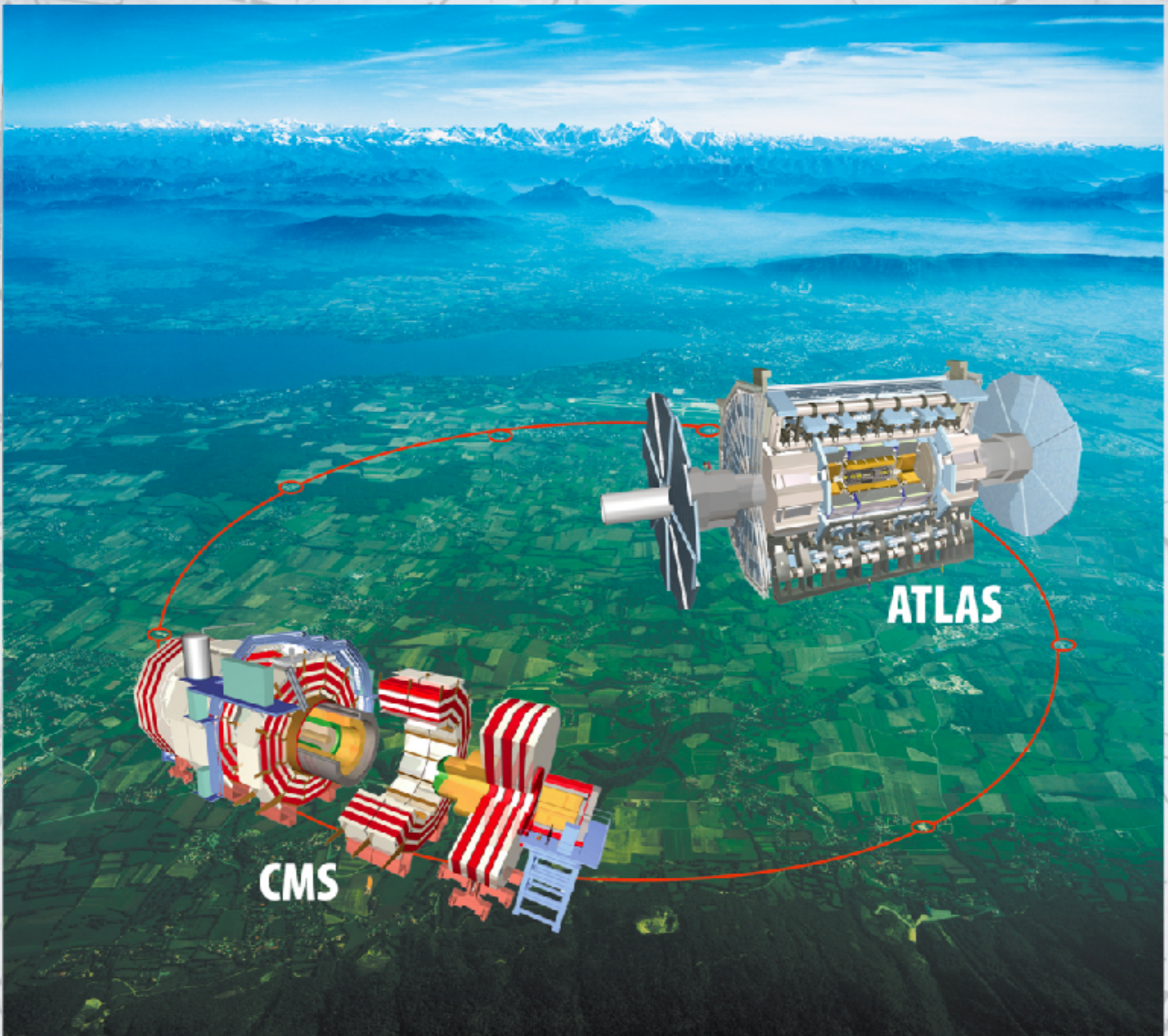
# SULLE TRACCE DELLE PARTICELLE

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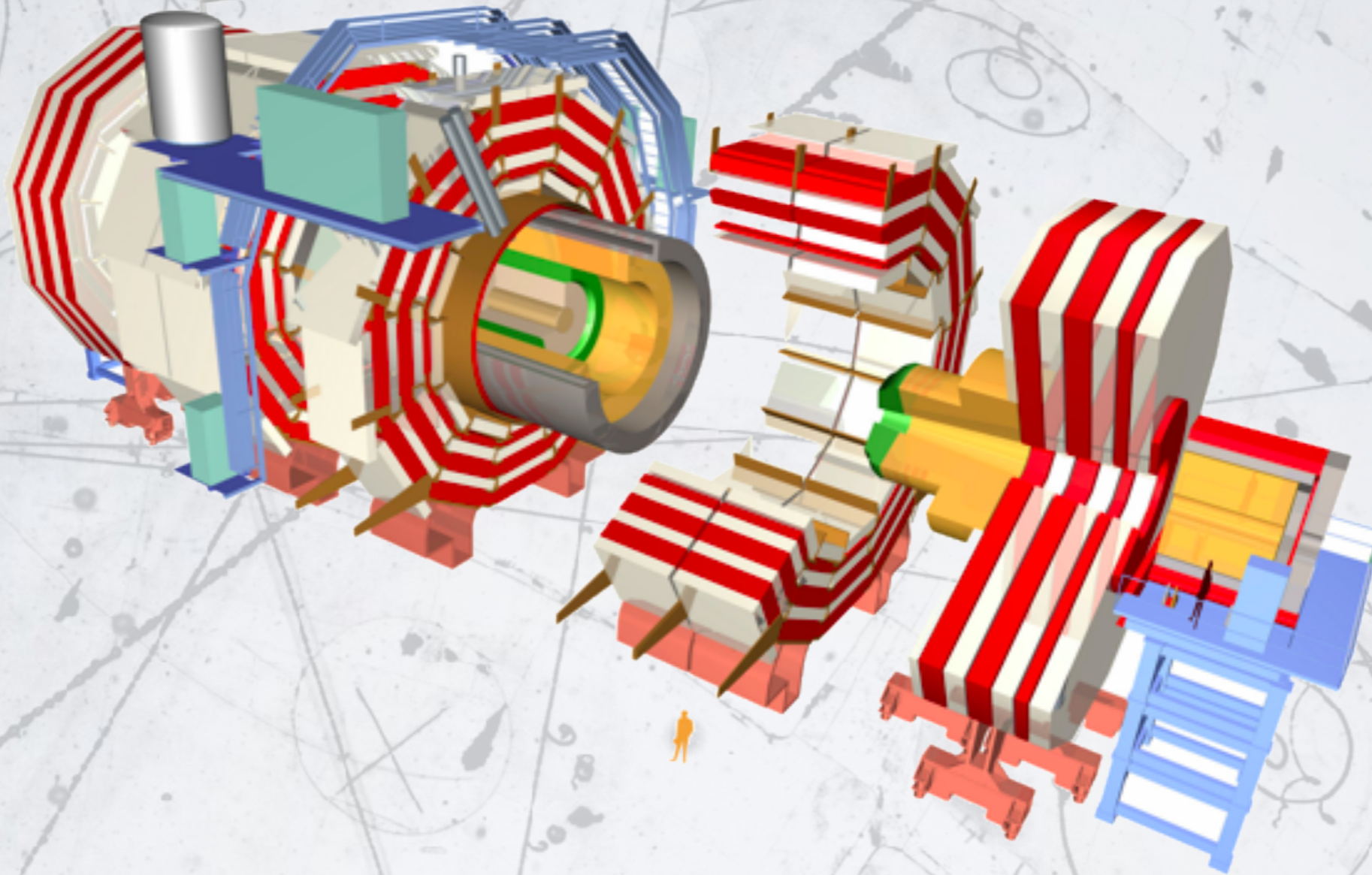


# SULLE TRACCE DELLE PARTICELLE

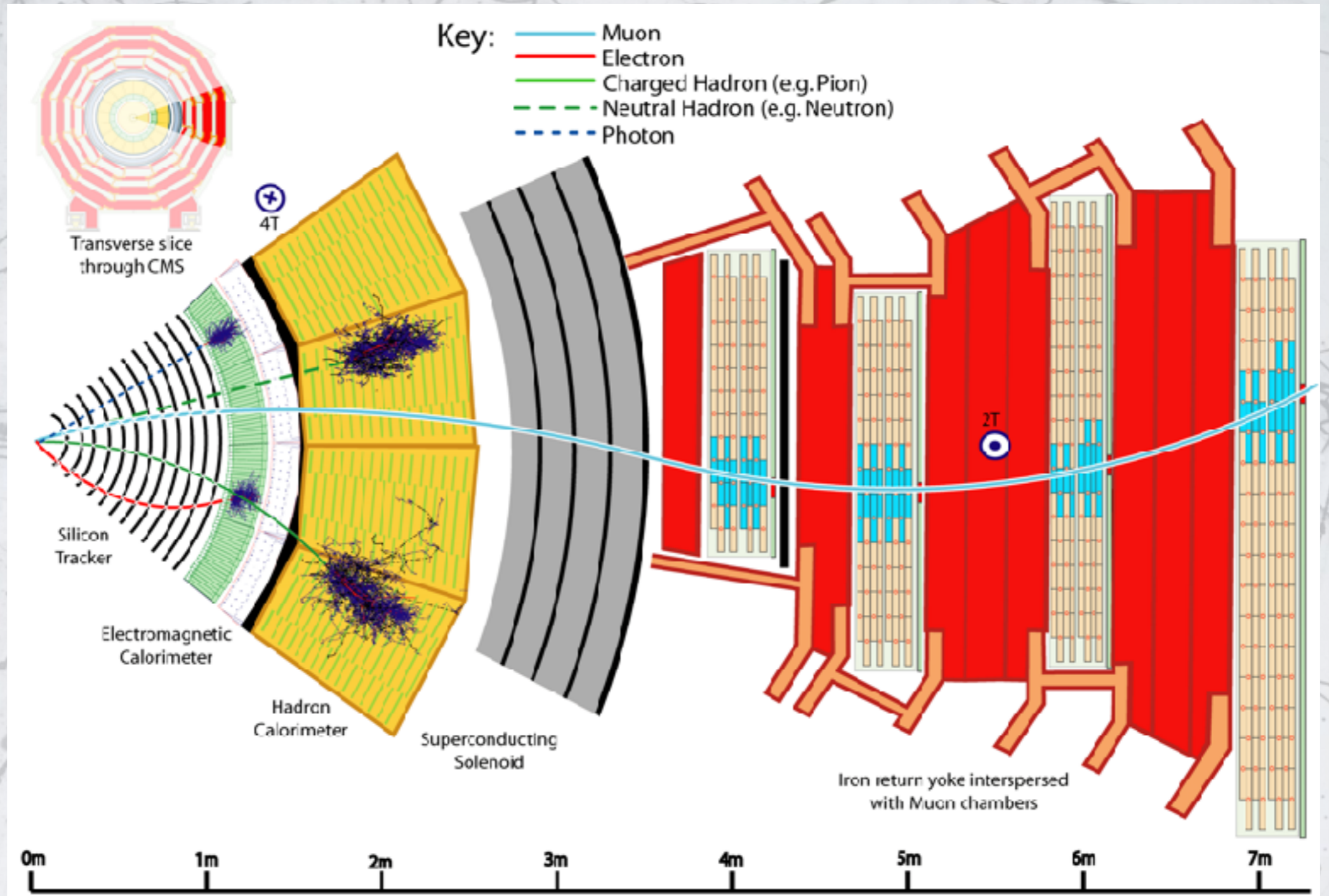




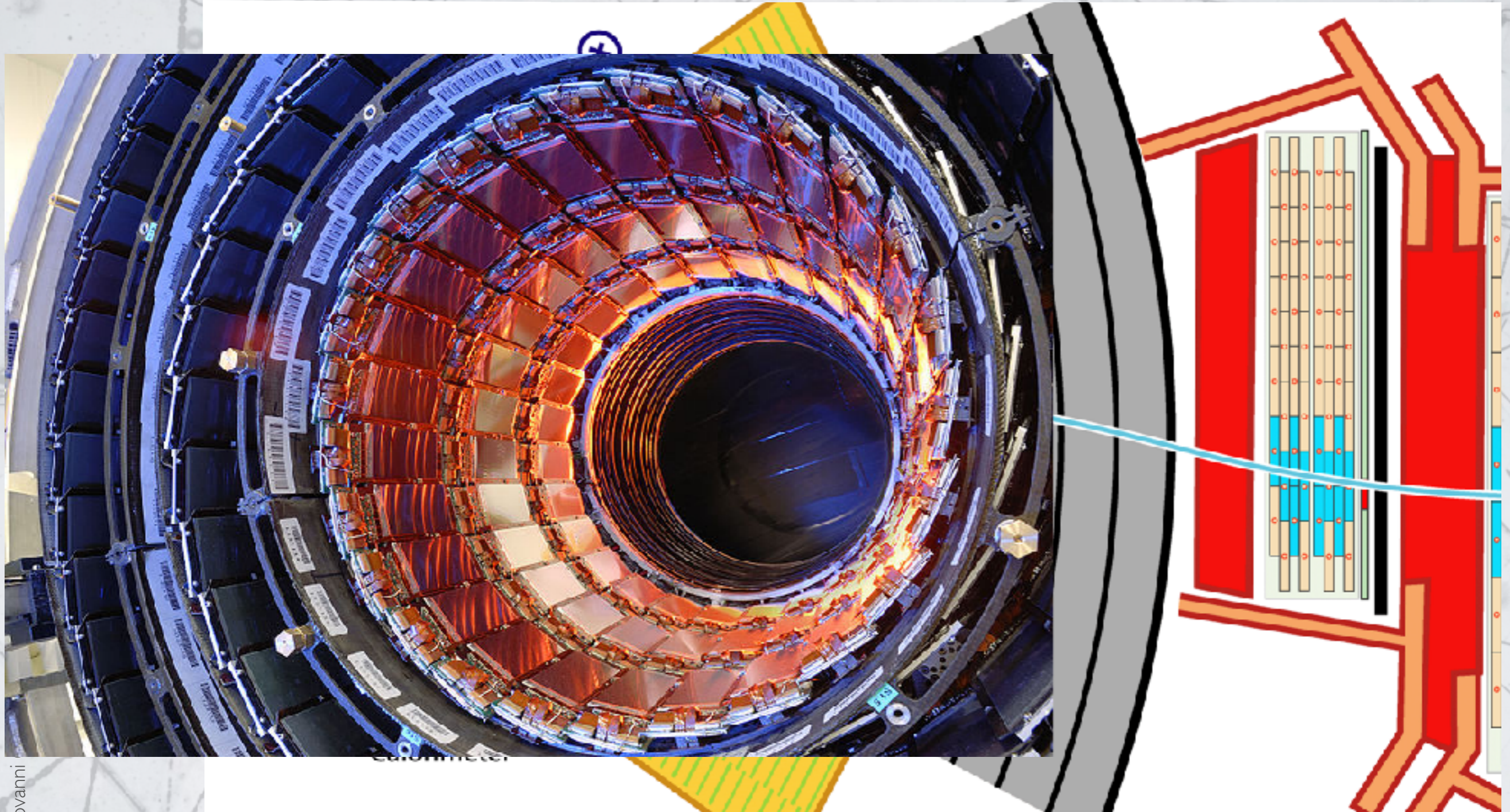
# UN RIVELATORE



# UN RIVELATORE DI PARTICELLE

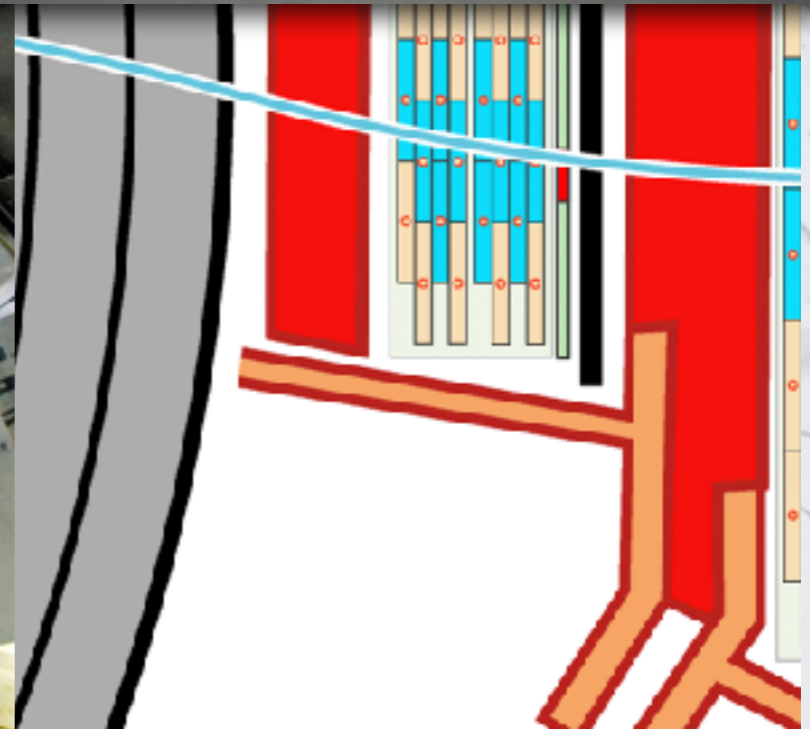
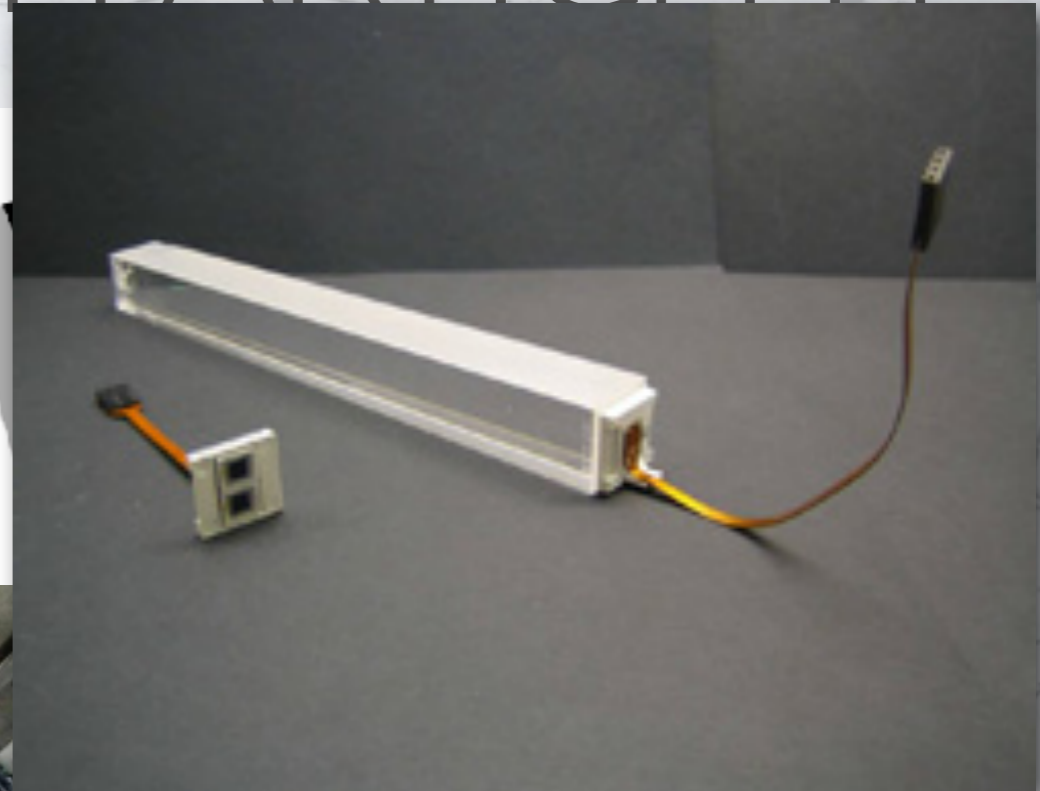
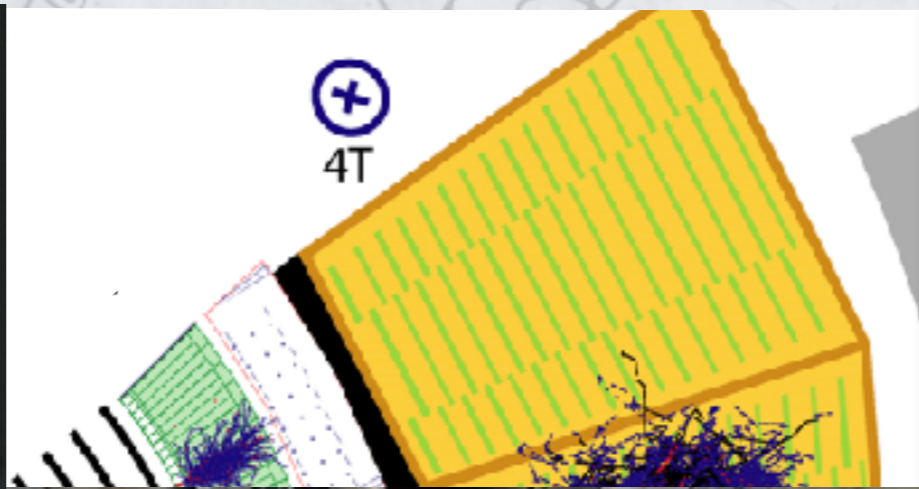


# UN RIVELATORE DI PARTICELLE

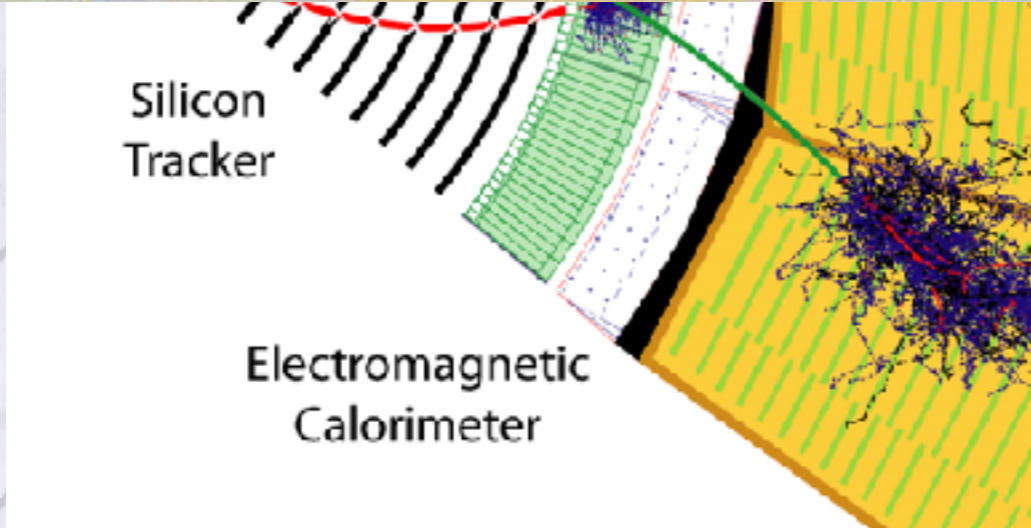
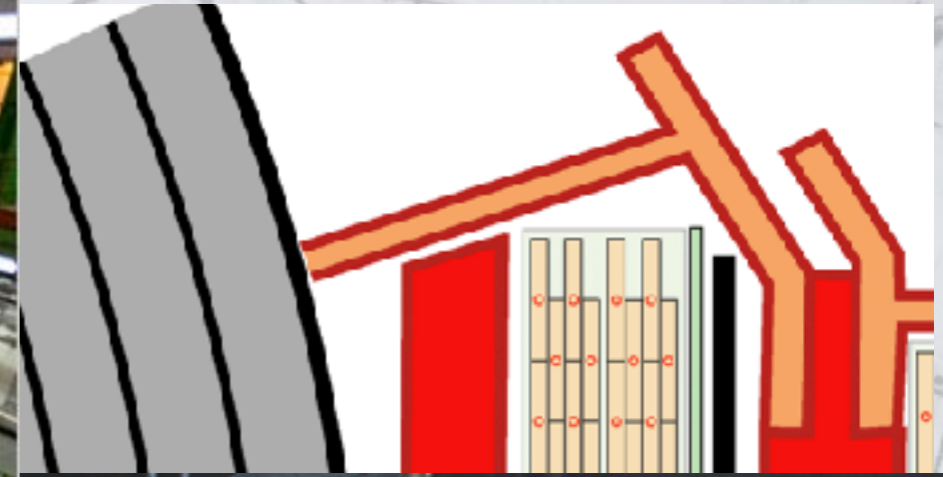
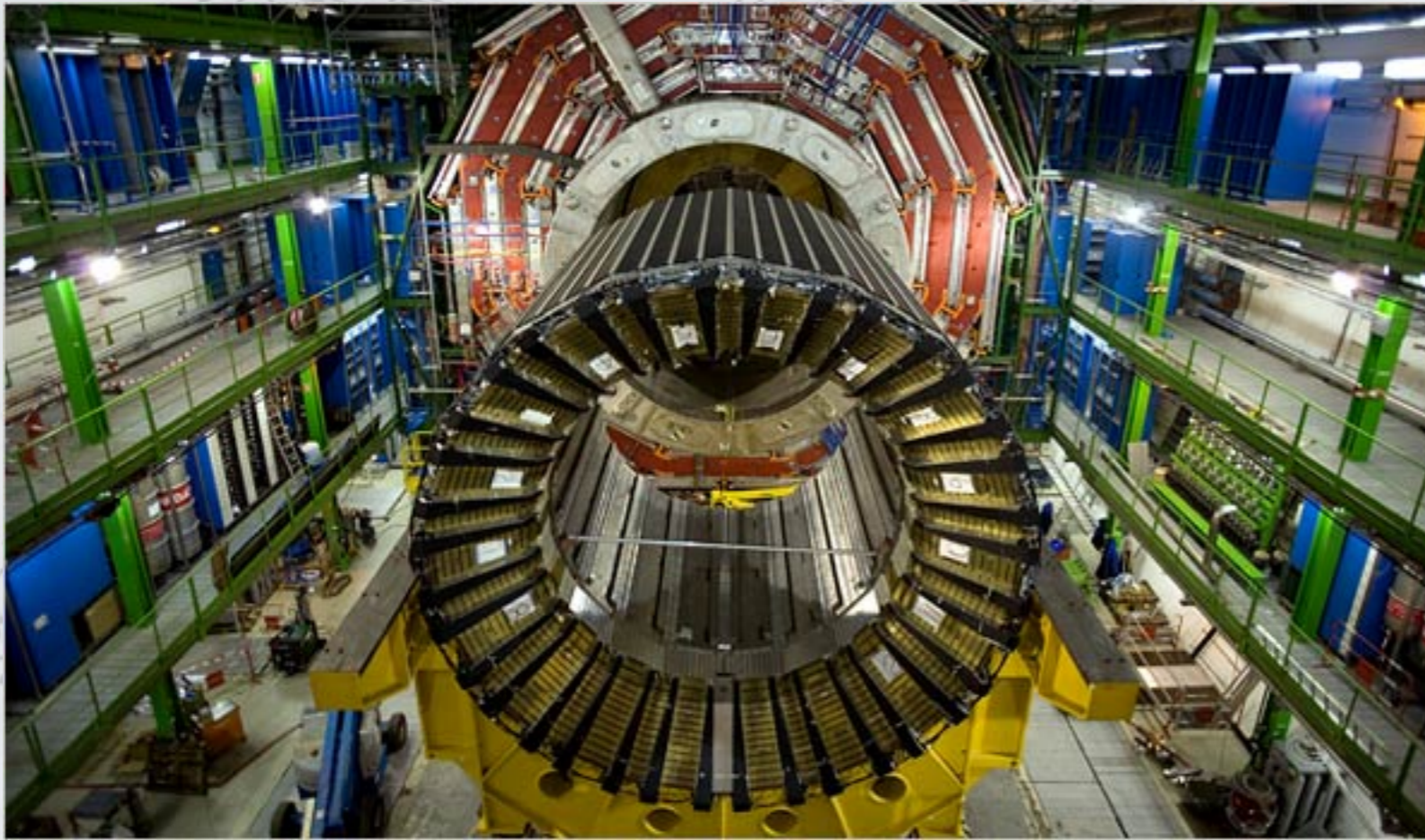


Giovanni

# UN RIVELATORE DI PARTICELLE



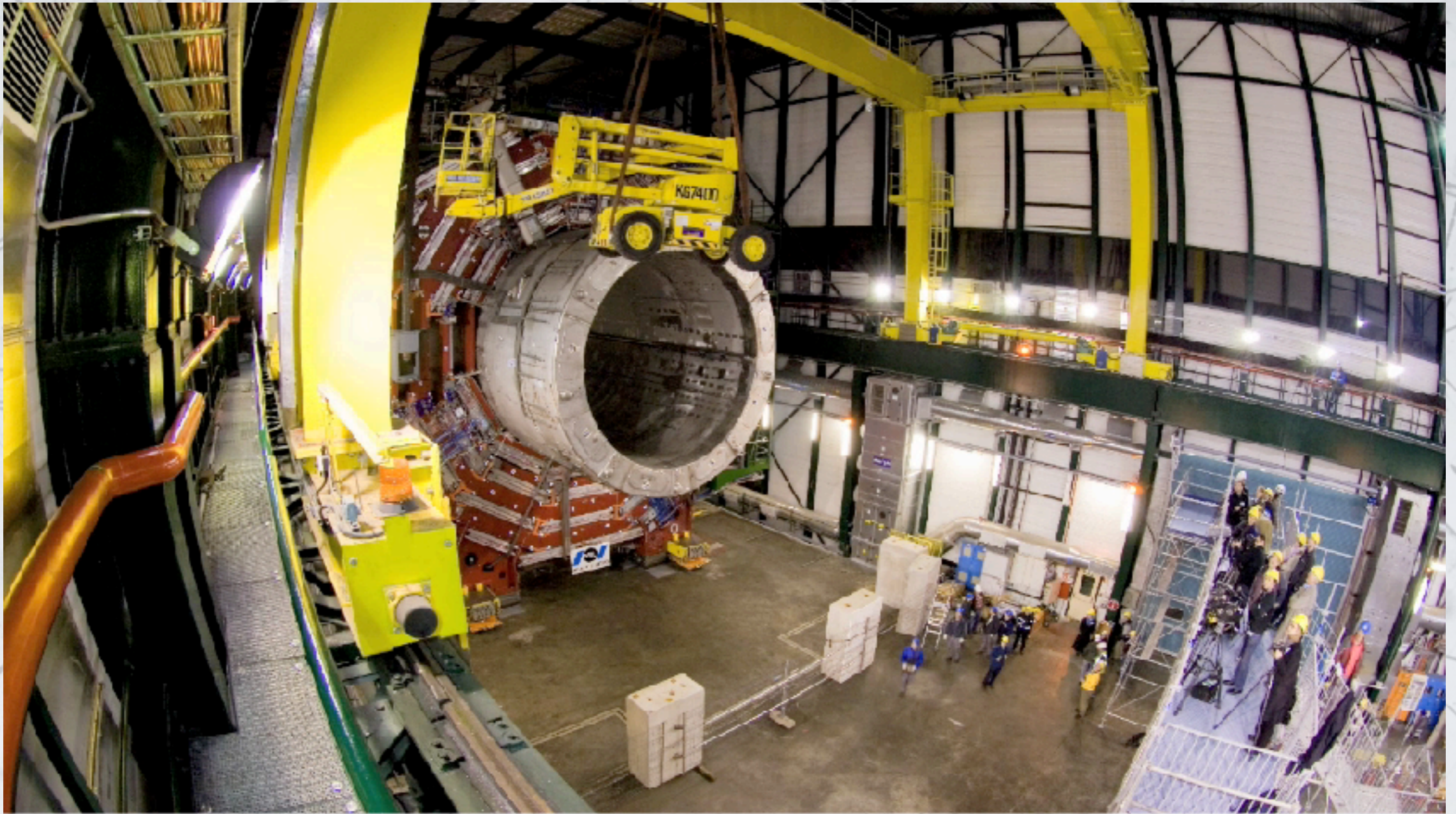
# UN RIVELATORE DI PARTICELLE

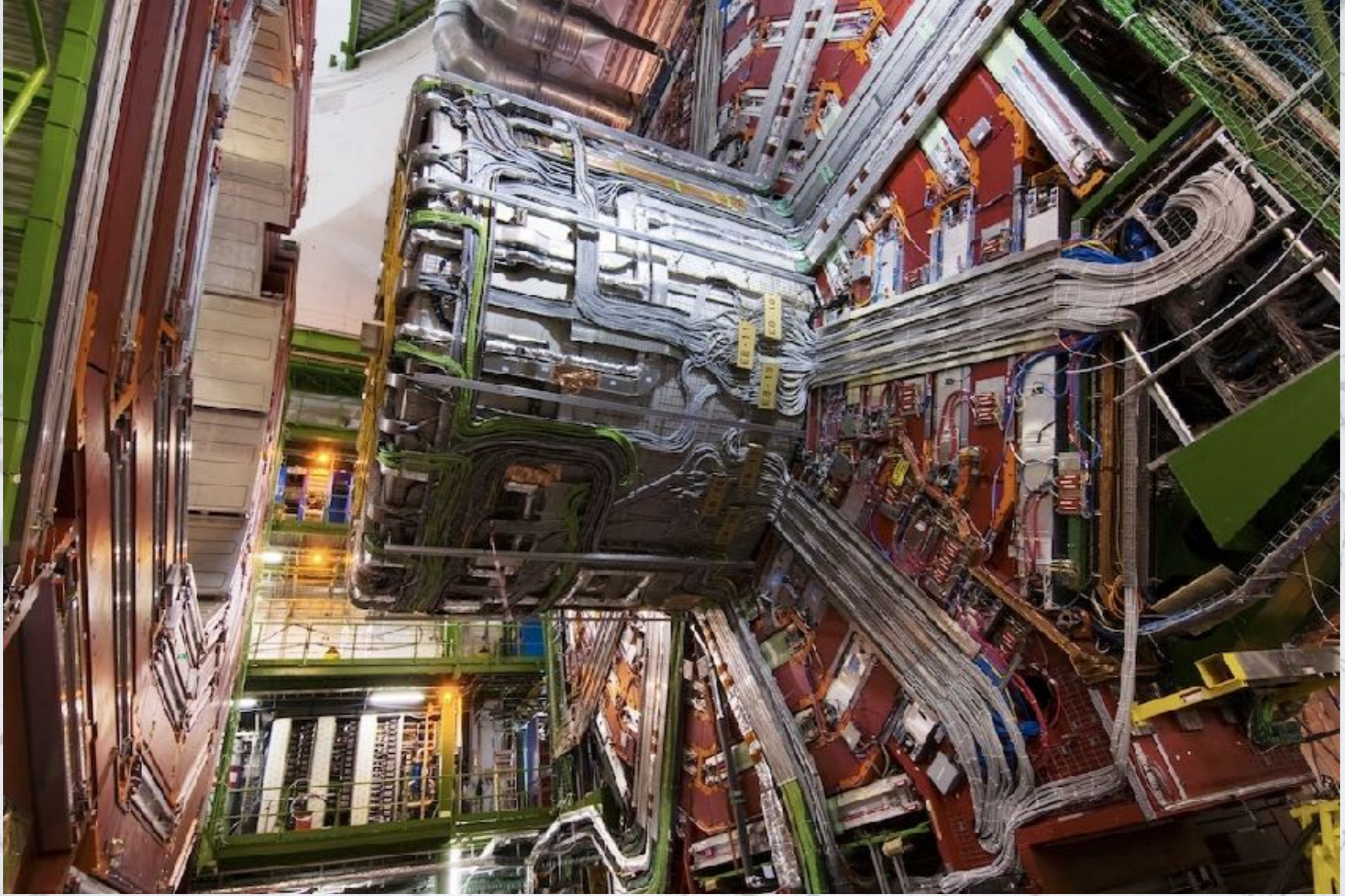


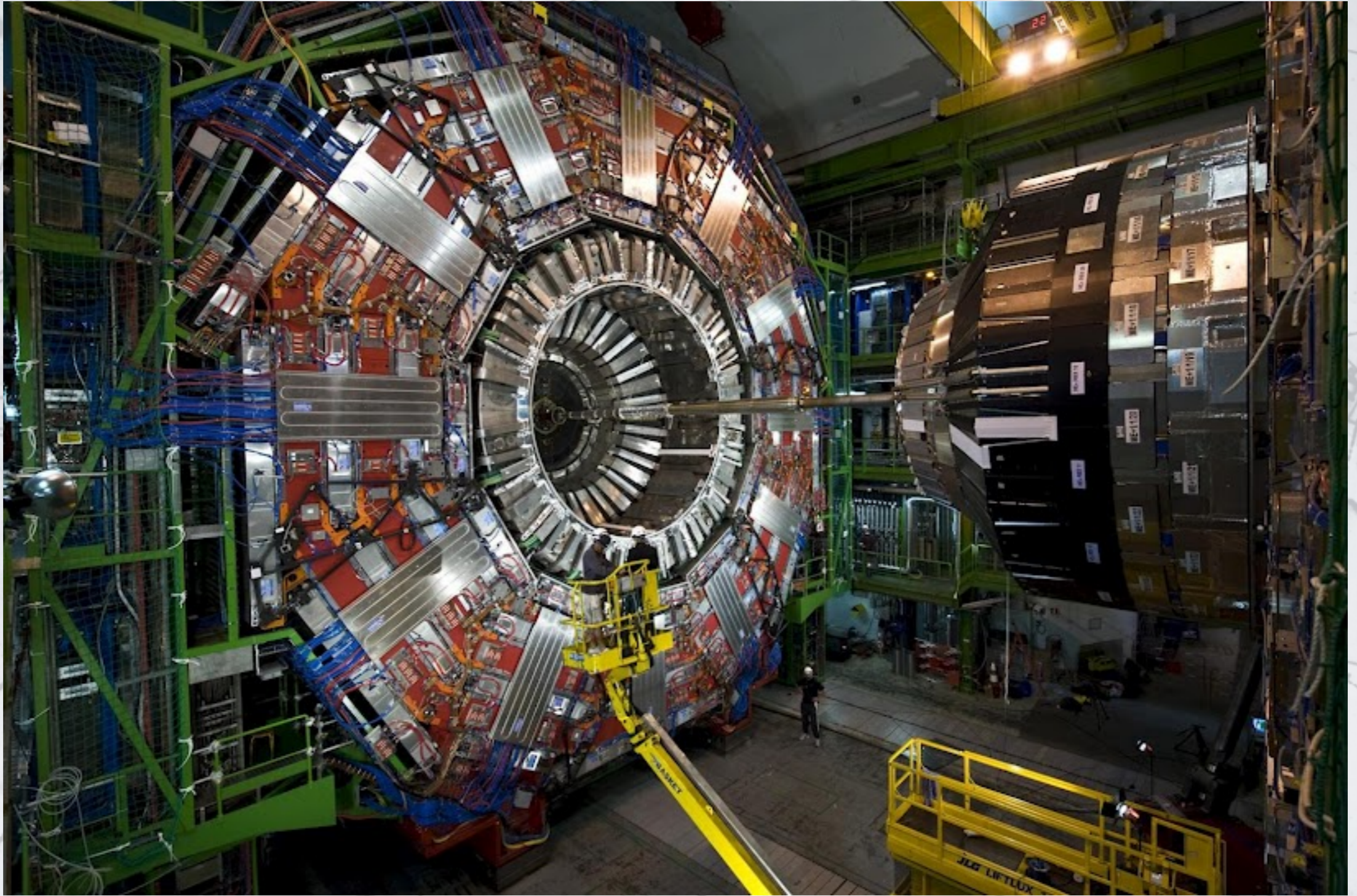
# UN RIVELATORE DI PARTICELLE

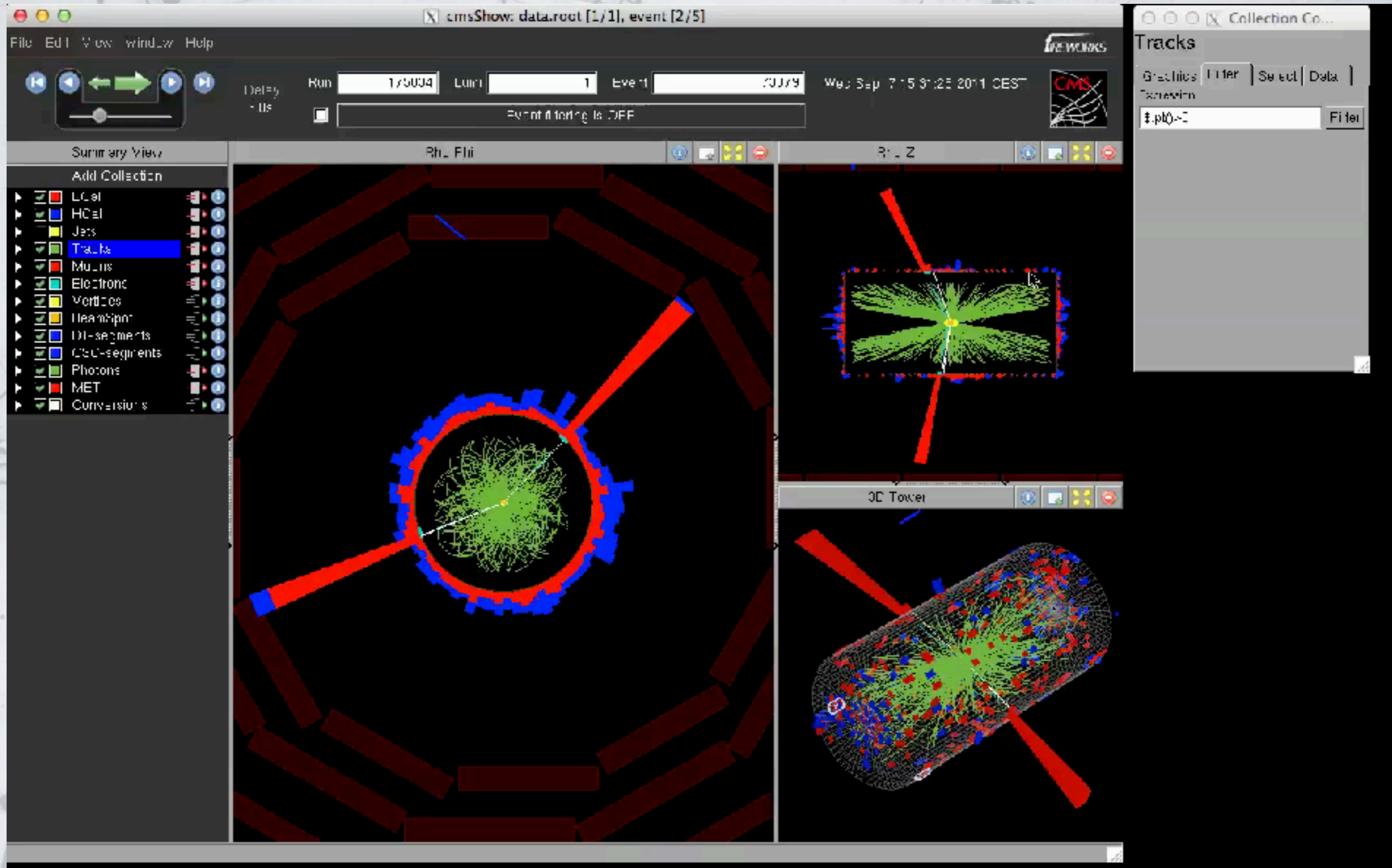


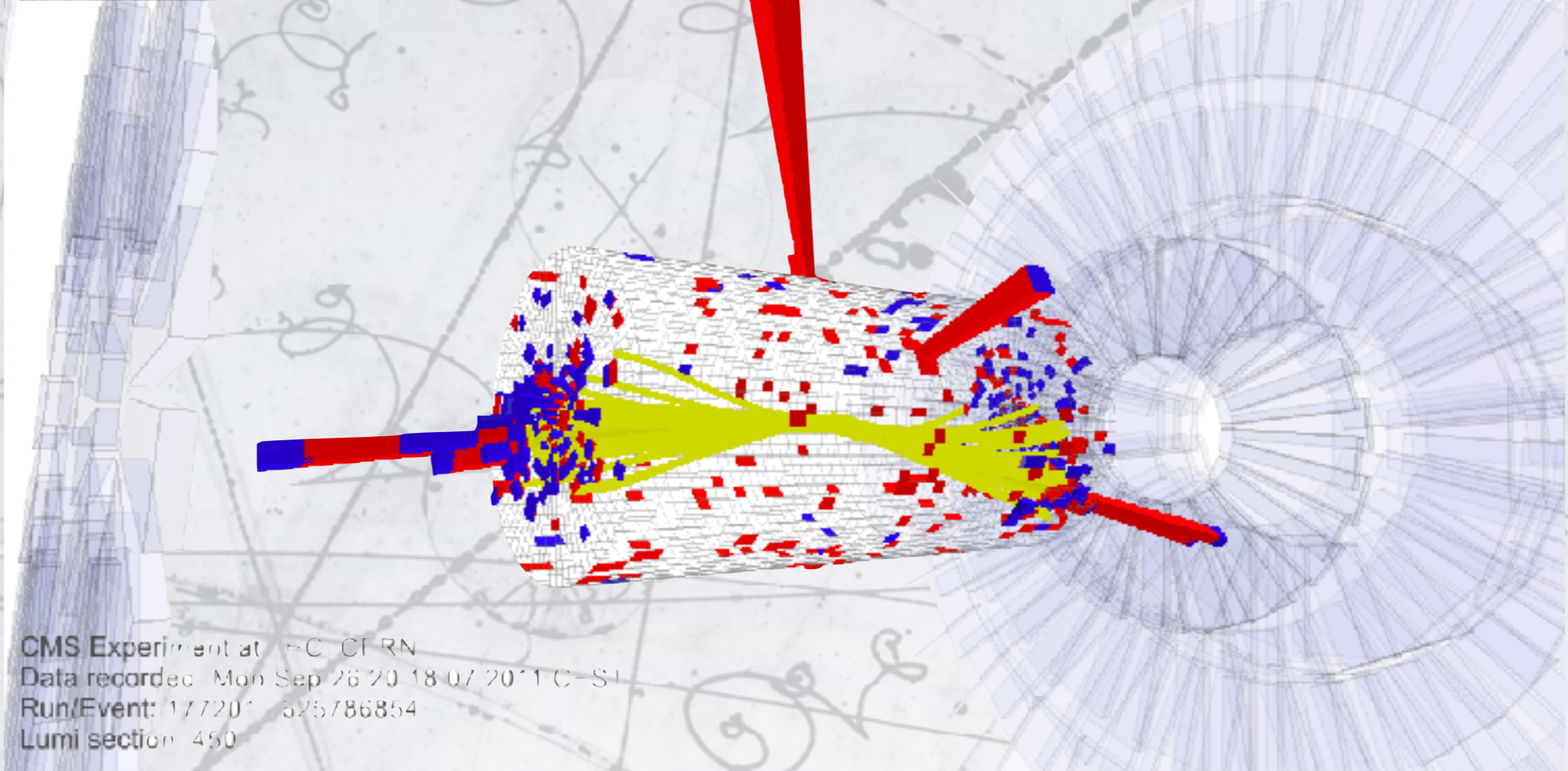












CMS Experiment at LHC, CERN  
Data recorded: Mon Sep 26 20:18:07 2011 C-S1  
Run/Event: 177201 625786854  
Lumi section: 450

# COME SI SCOPRE UNA PARTICELLA

**Top News story**

**Higgs-like particle 'discovered'**

Scientists at the Large Hadron Collider claim the discovery of a particle believed to be the long-sought Higgs boson

**Scoperto il Bosone di Higgs: i siti stranieri**

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**EL PAÍS**

**La misteriosa partícula**

1. En busca del bosón

El primer del laboratorio europeo de física de partículas del CERN

El País | Madrid | 4 Jul 2012 | 14:07 CEST

**The New York Times**

**Science**

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Scienziato in Ginevra on Wednesday

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ANIMALI AMBIENTE VIDEO

**«Provata l'esistenza del bosone di Higgs» E' la particella all'origine dell'Universo**

Denominata «particella di Dio», consente a ogni cosa di avere «massa» e quindi l'esistenza della materia come la conosciamo

Del nostro inviato GIOVANNI CAPRARA

Higgs: il conferme di spaziosa bestia di 48 anni fa

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OGGI IN SCIENZA

L'influenza aviaria uccide i cuccioli di foena. Scienziati preoccupati per salma di specie

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**«La découverte du boson de Higgs est historique»**

Interview: Christine Talca, MIA à jour le 04.07.2012

Pour le professeur Aurelio Bay, de l'EPFL, la découverte de la particule de Dieu au CERN représente un tournant dans le monde de la physique.

**Il Sole 24 ORE**

Milano 29°

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Cellulari Computing Digital entertainment Social Network Media Green Energia

**Bosone di Higgs e perché**

4 luglio 2012 Cronologia articolo

Accedi a MyE

fa parte delle nostre vite, come se fosse stato sempre crescendo di interesse e di clic sui vari siti, compreso corda più le partite della nazionale di calcio che una piuttosto astrusa.

percezione che qualcosa di grosso, di importante sia e che le dichiarazioni degli scienziati, prudenti ma rifichino che siamo ad una svolta nella comprensione così è.

**Bosone di Higgs e perché è così importante?**

**Book di Repubblica**

Arriva un robot dal futuro. Vogliamo capirlo? La vita è nota e...

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**Higgs davvero**

che spiega come mai tutte le cose nell'universo sono fatte di materia. Ma è anche diventato più insalubre. Ma è anche diventato più insalubre. Ma è anche diventato più insalubre.

**La Hack: "Qual è la particella di Dio?"**

annuncio nell'aula di un grimo di scienziati. Consiglio europeo per la ricerca nucleare a...

**Aujourd'hui**

LES QUARANTES A LA LUNE

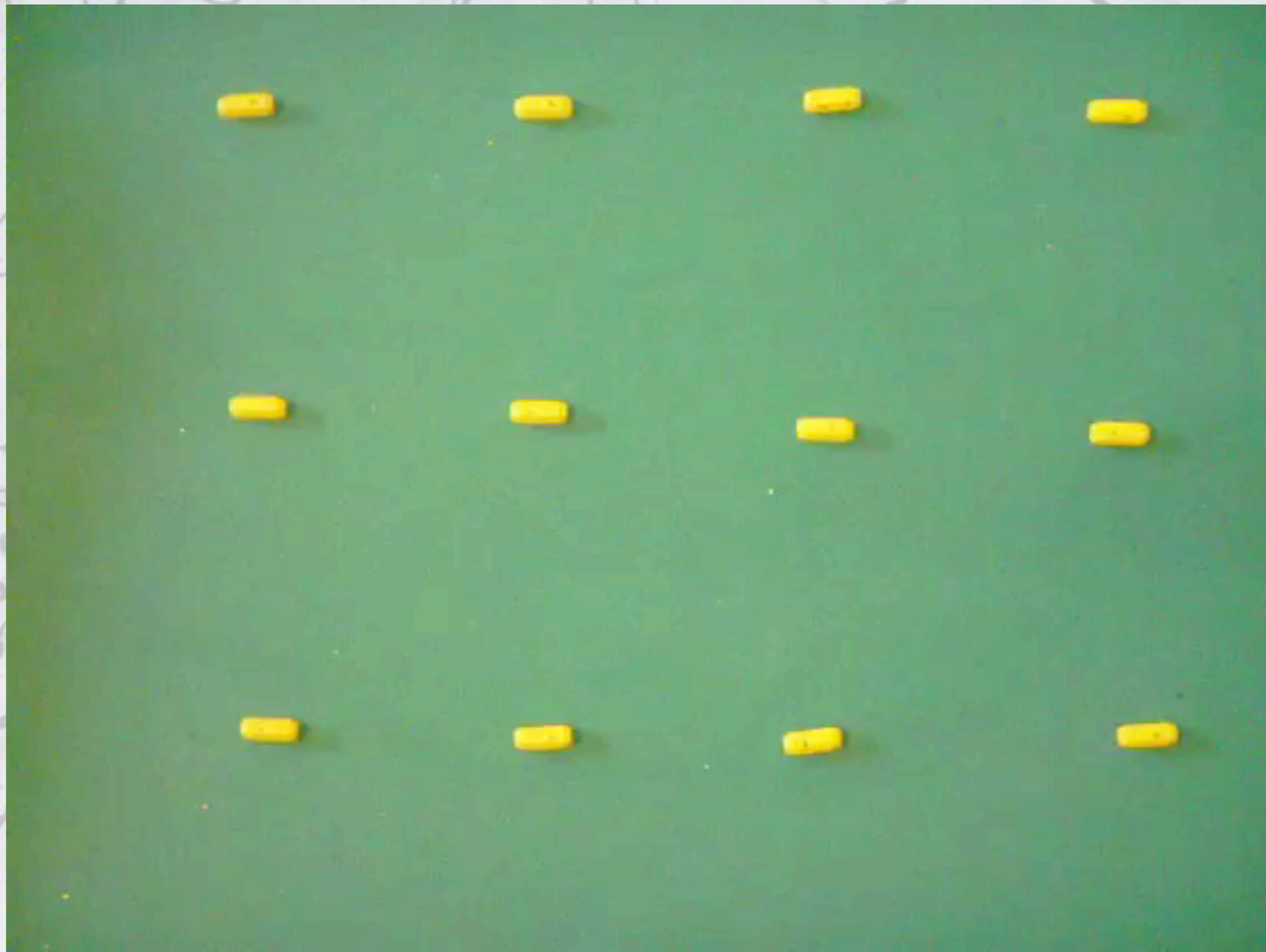
**JACQUES**

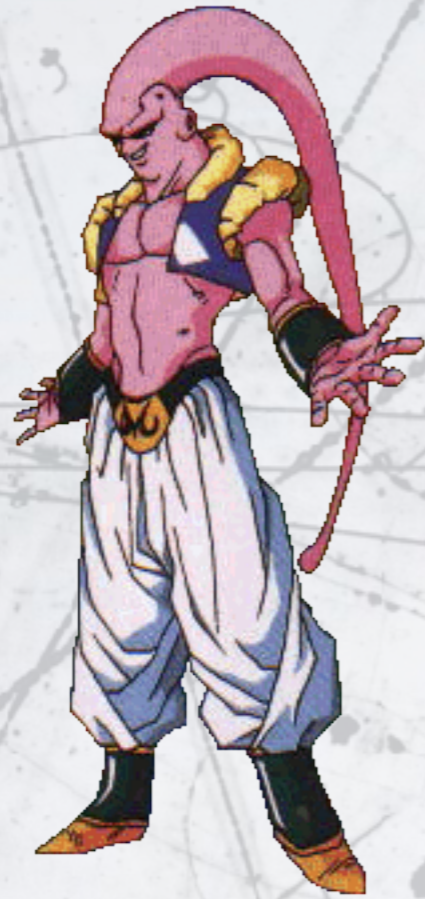
Scoperto il Bosone di Higgs: i siti stranieri

Giovanni Organtini - Sapientia



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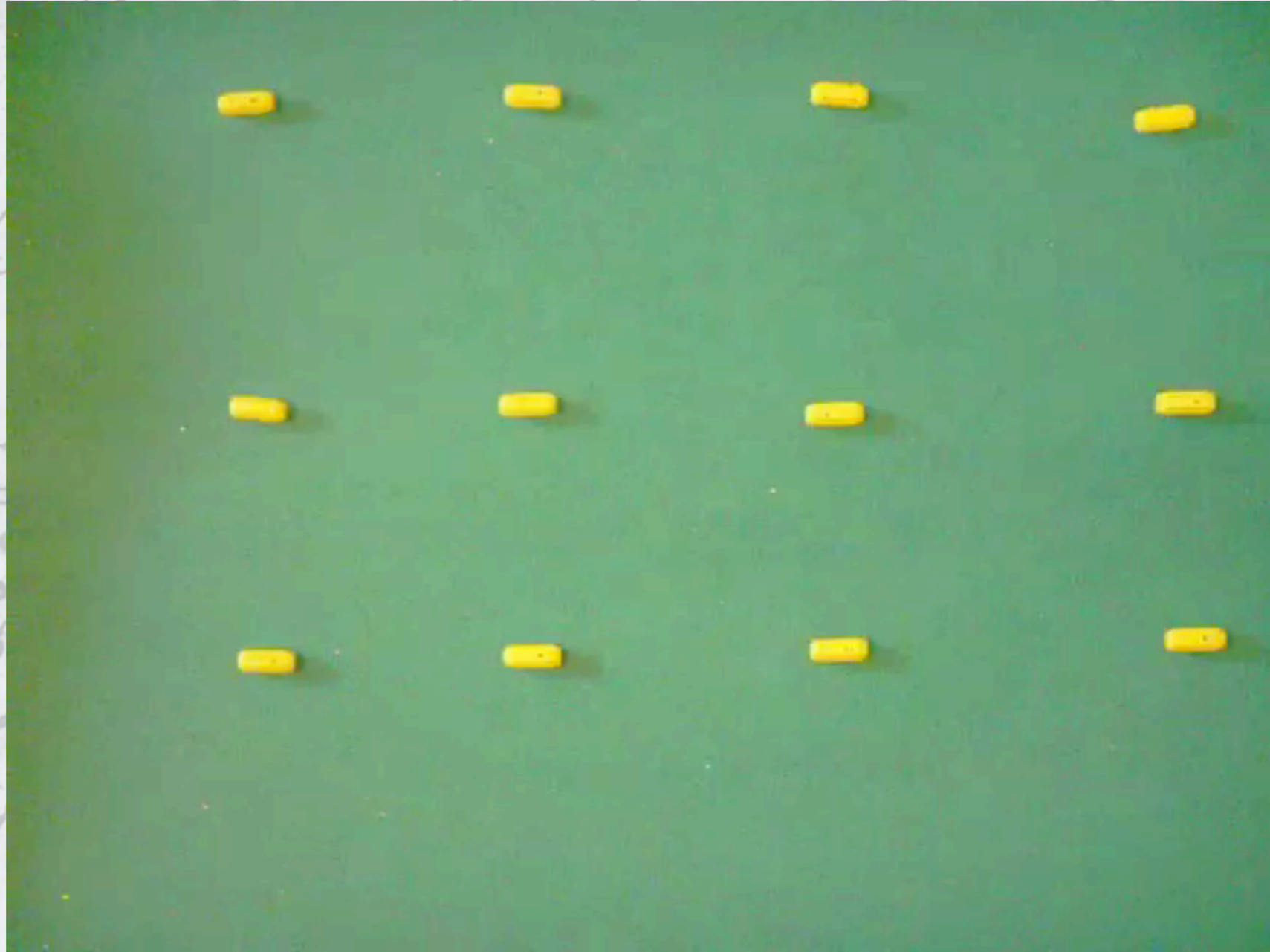


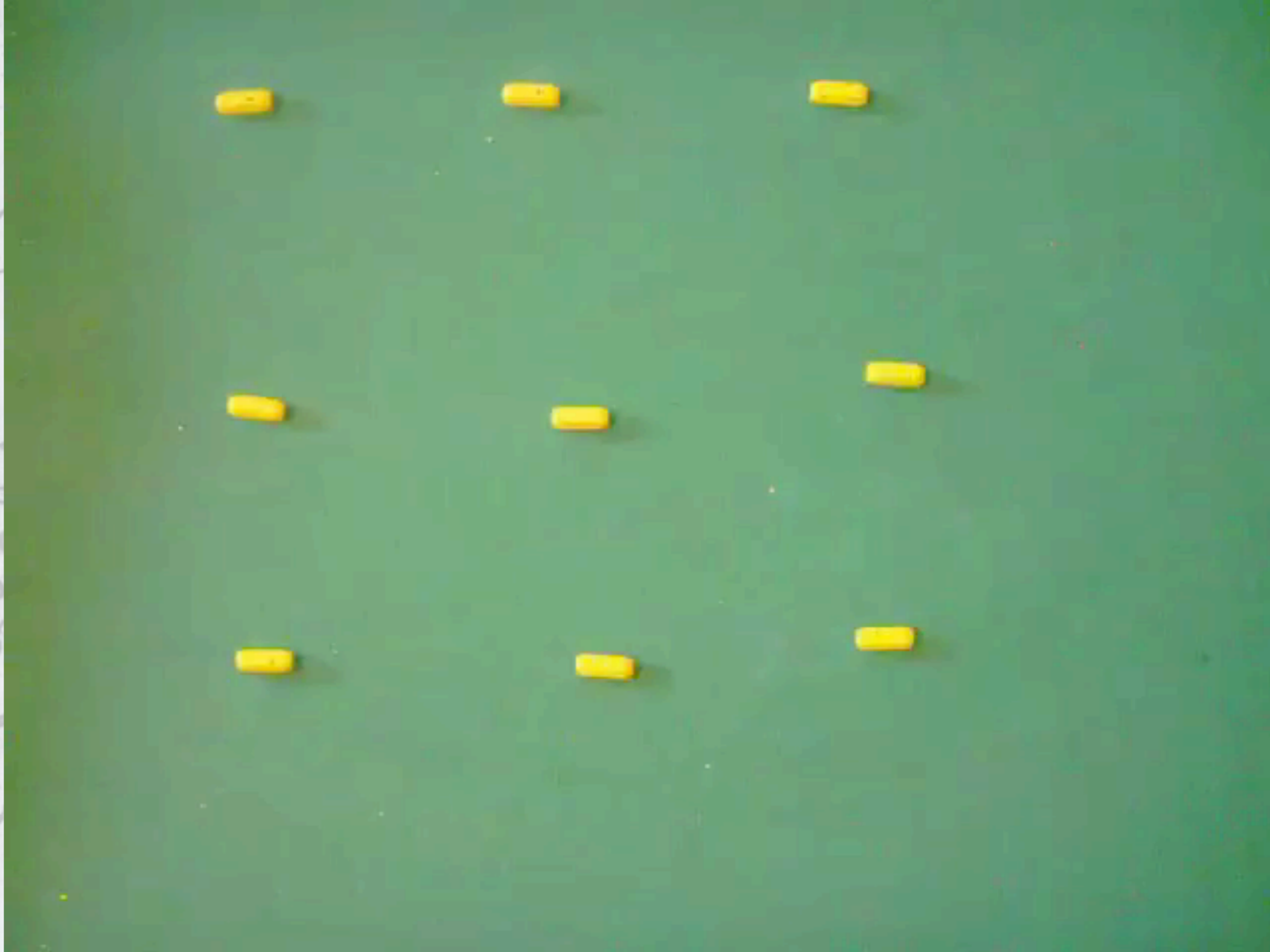


elettrone

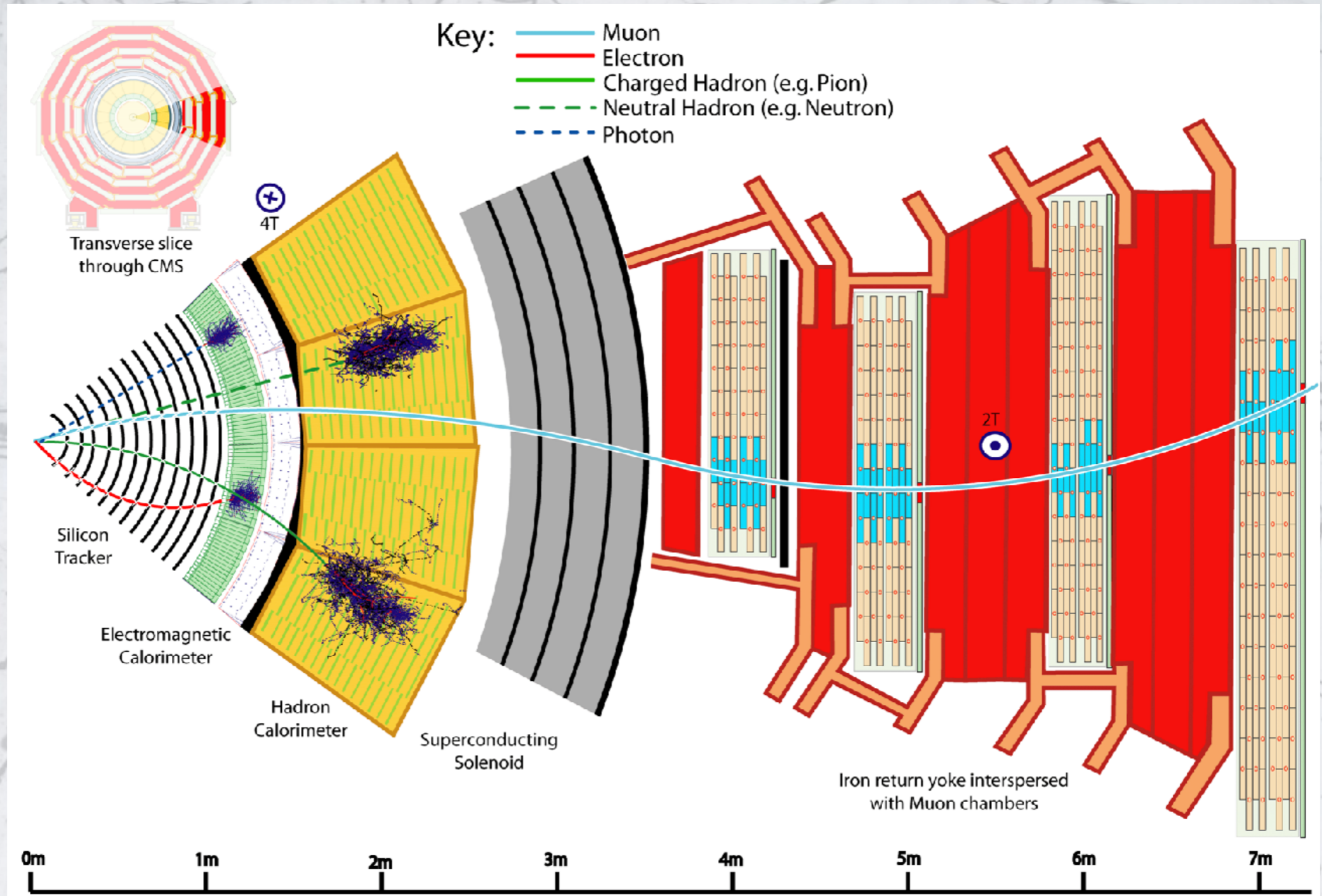


muone



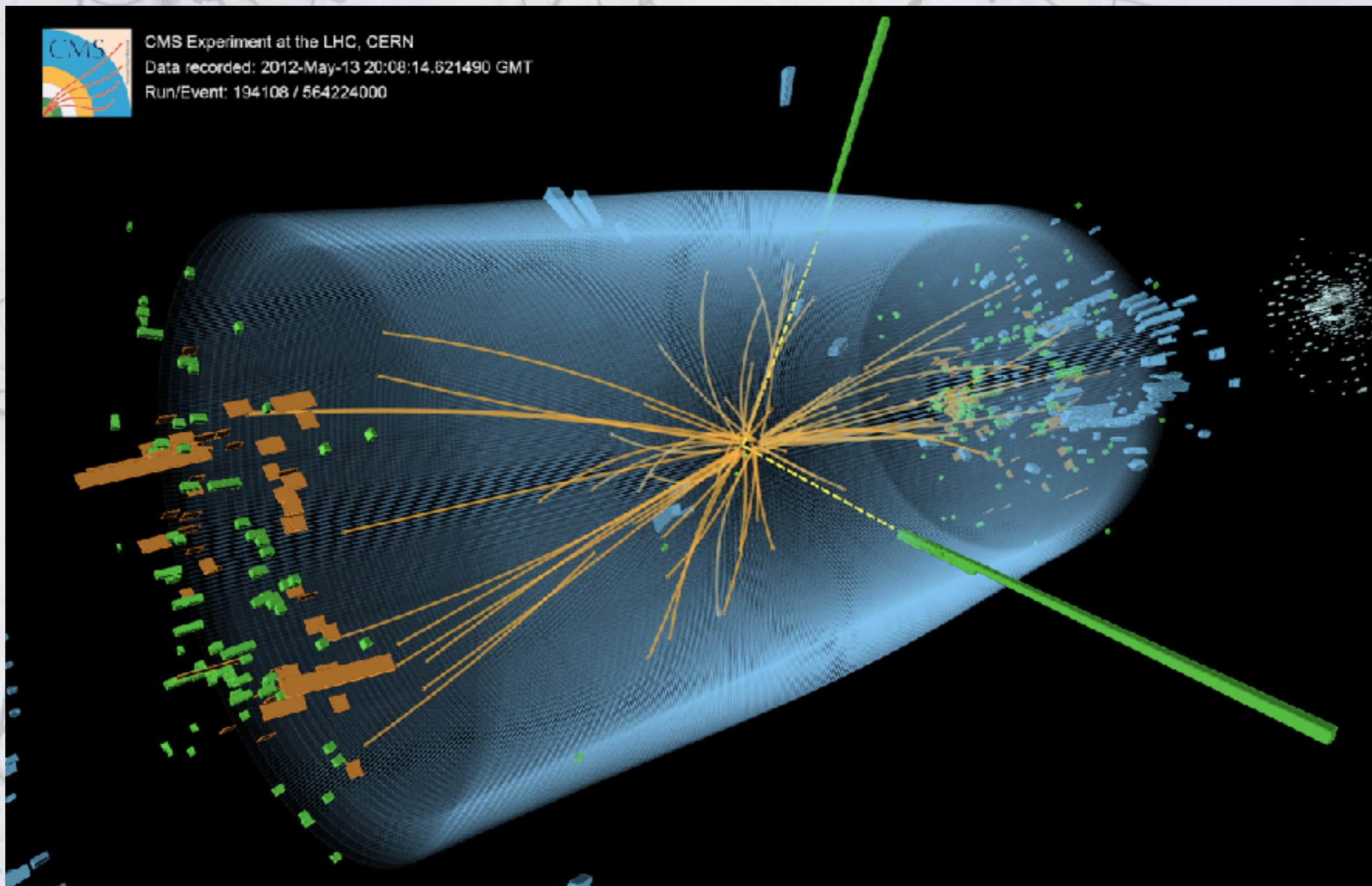


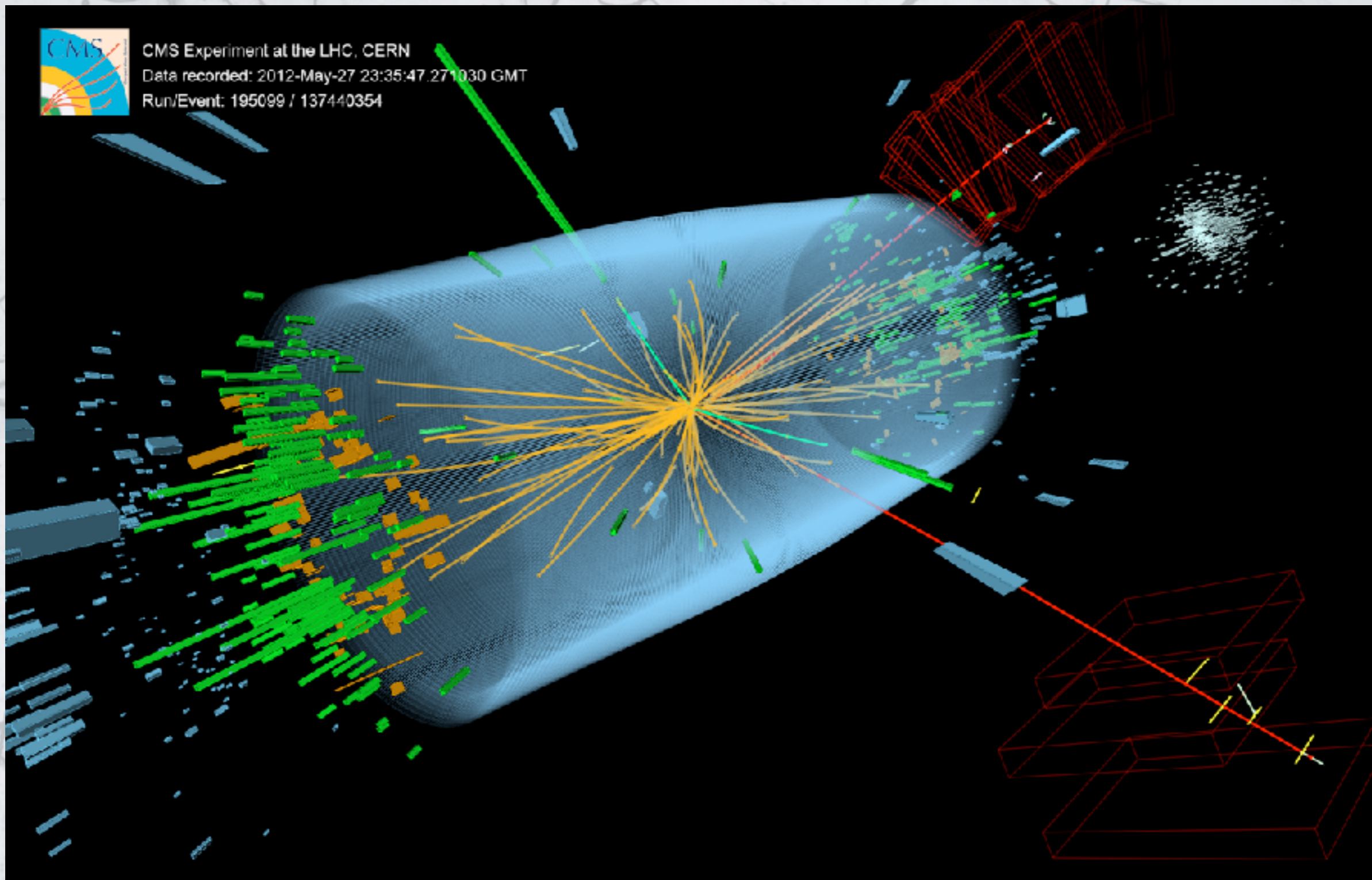
# UN RIVELATORE DI PARTICELLE

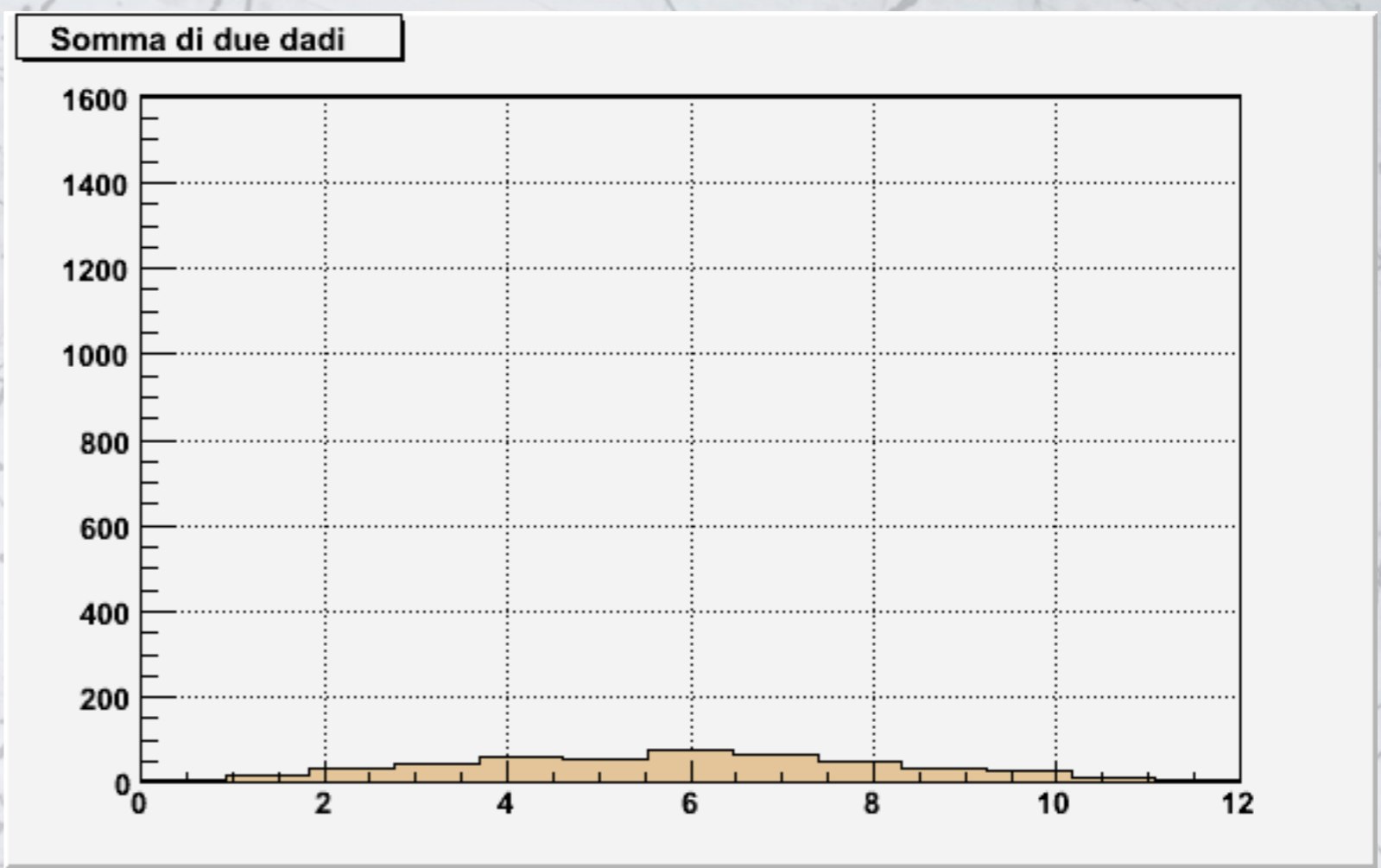


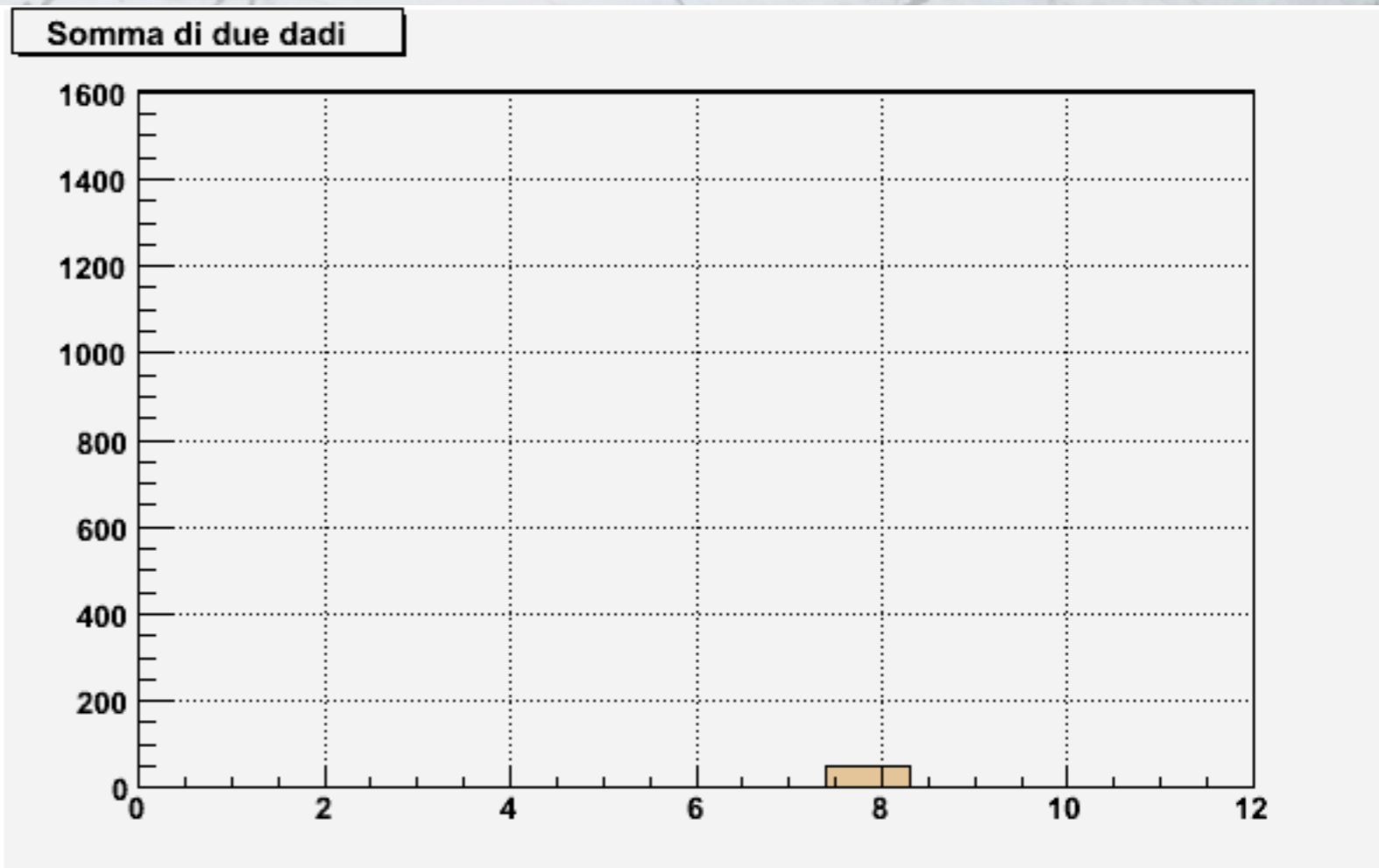


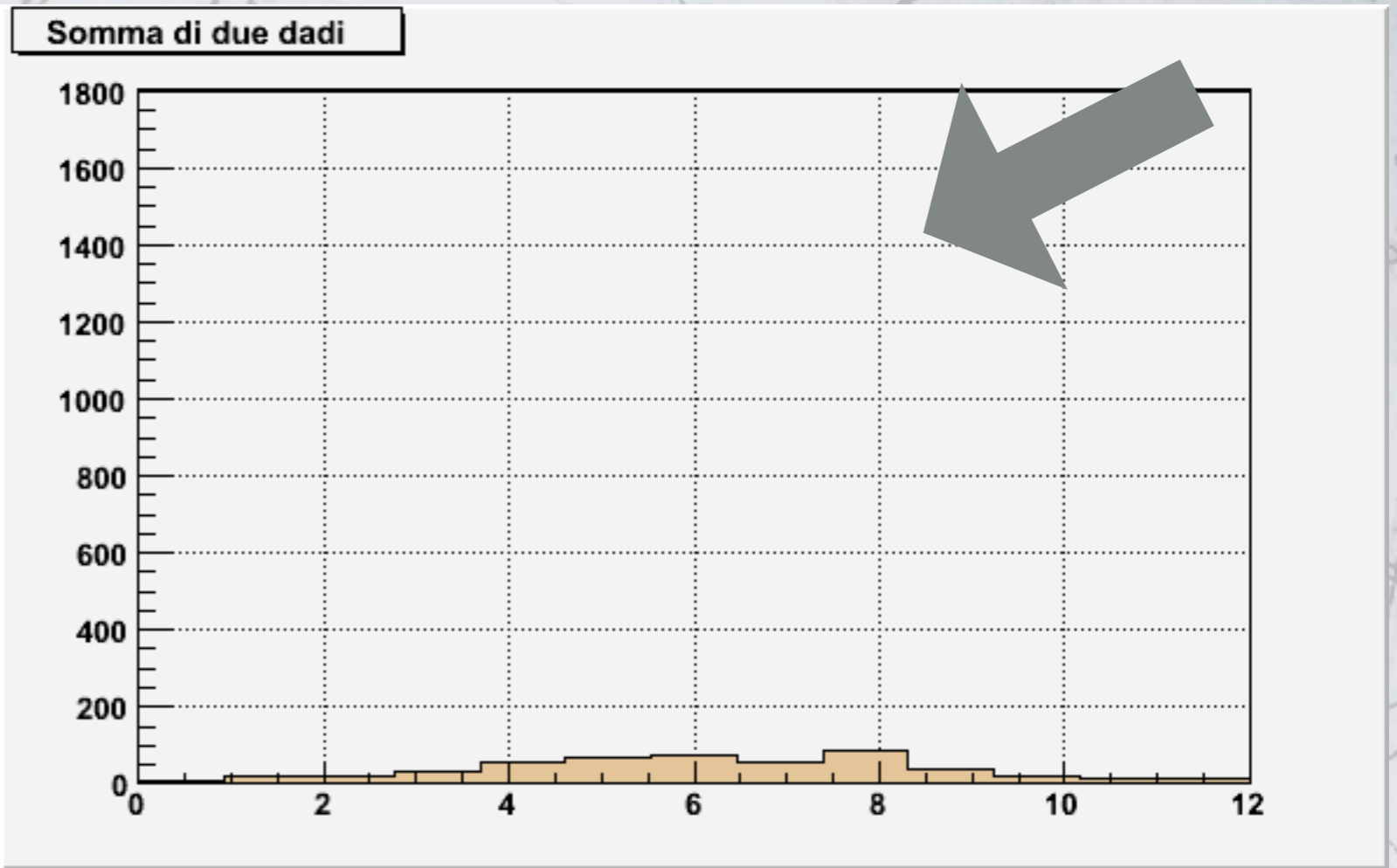
CMS Experiment at the LHC, CERN  
Data recorded: 2012-May-13 20:08:14.621490 GMT  
Run/Event: 194108 / 564224000

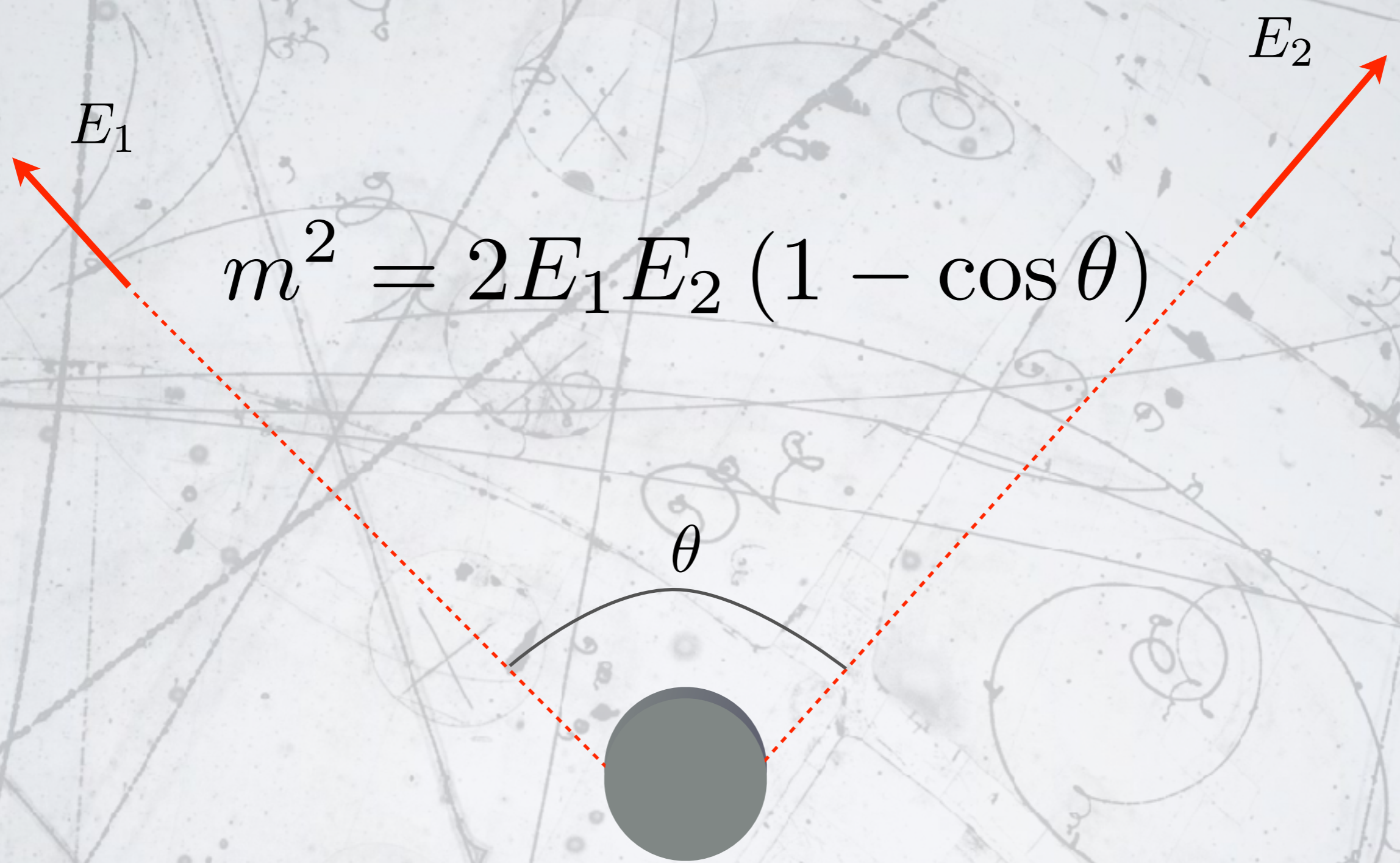


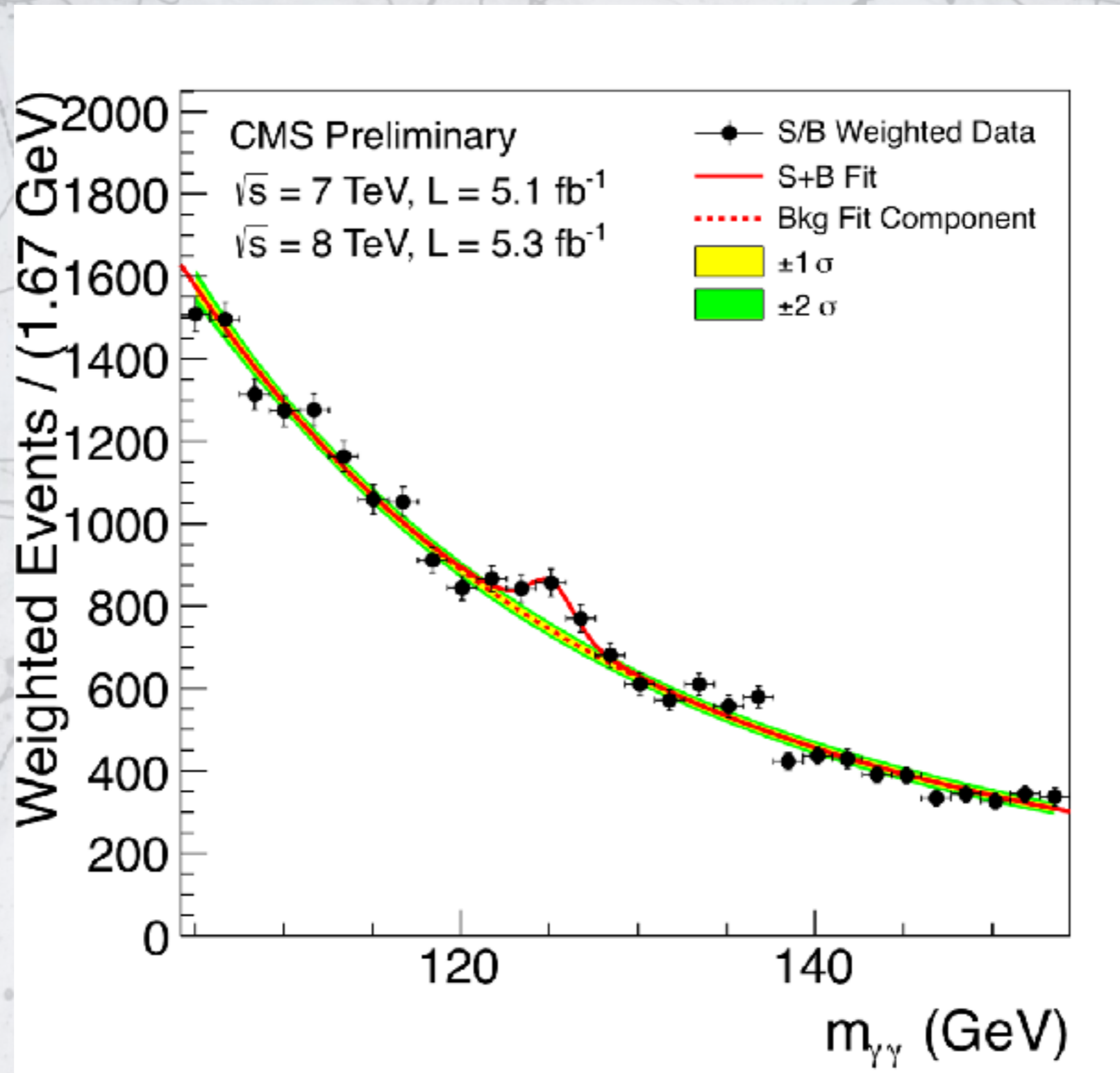


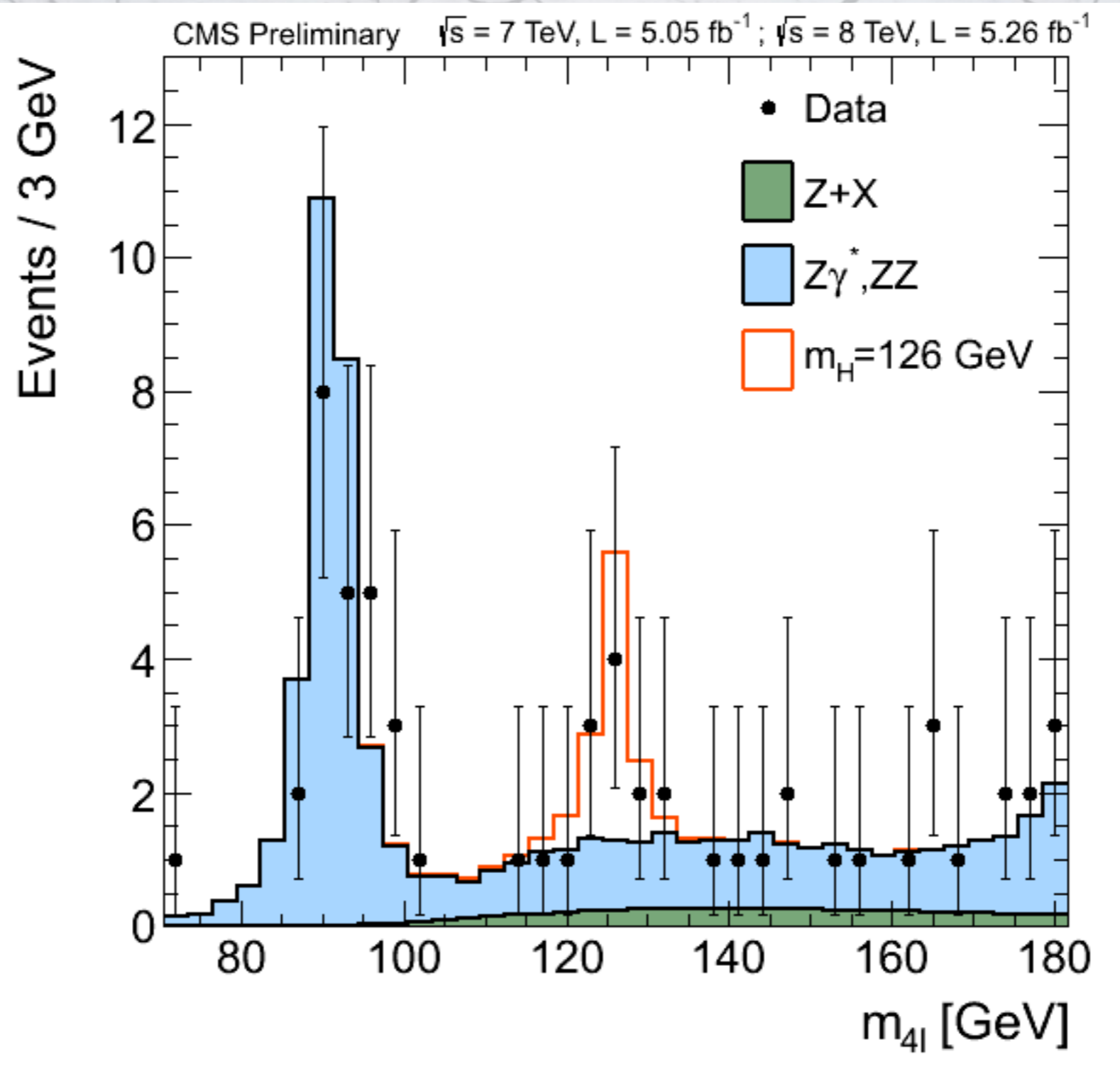












# E ADESSO TOCCA A TE...

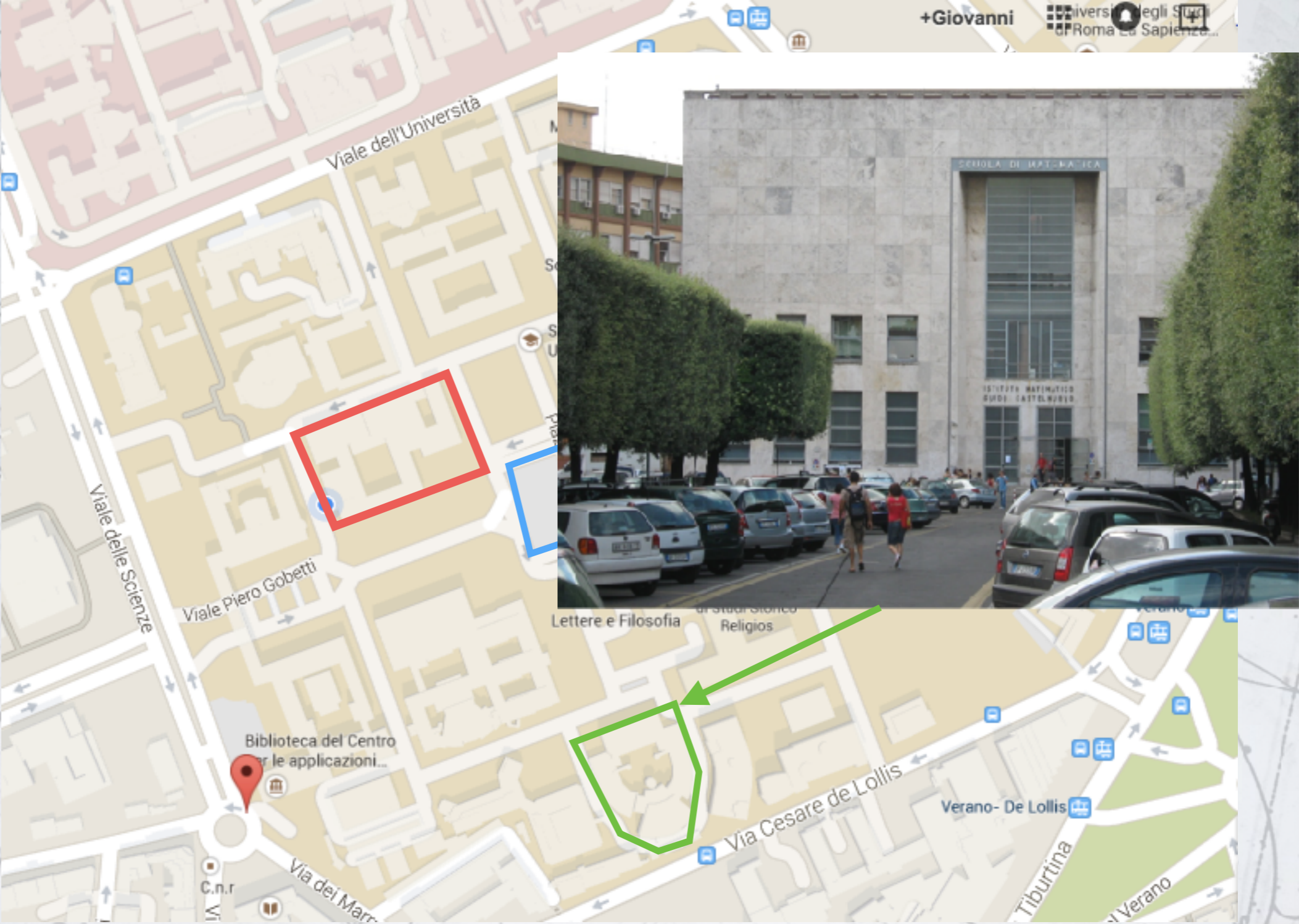


# DOVE SIAMO

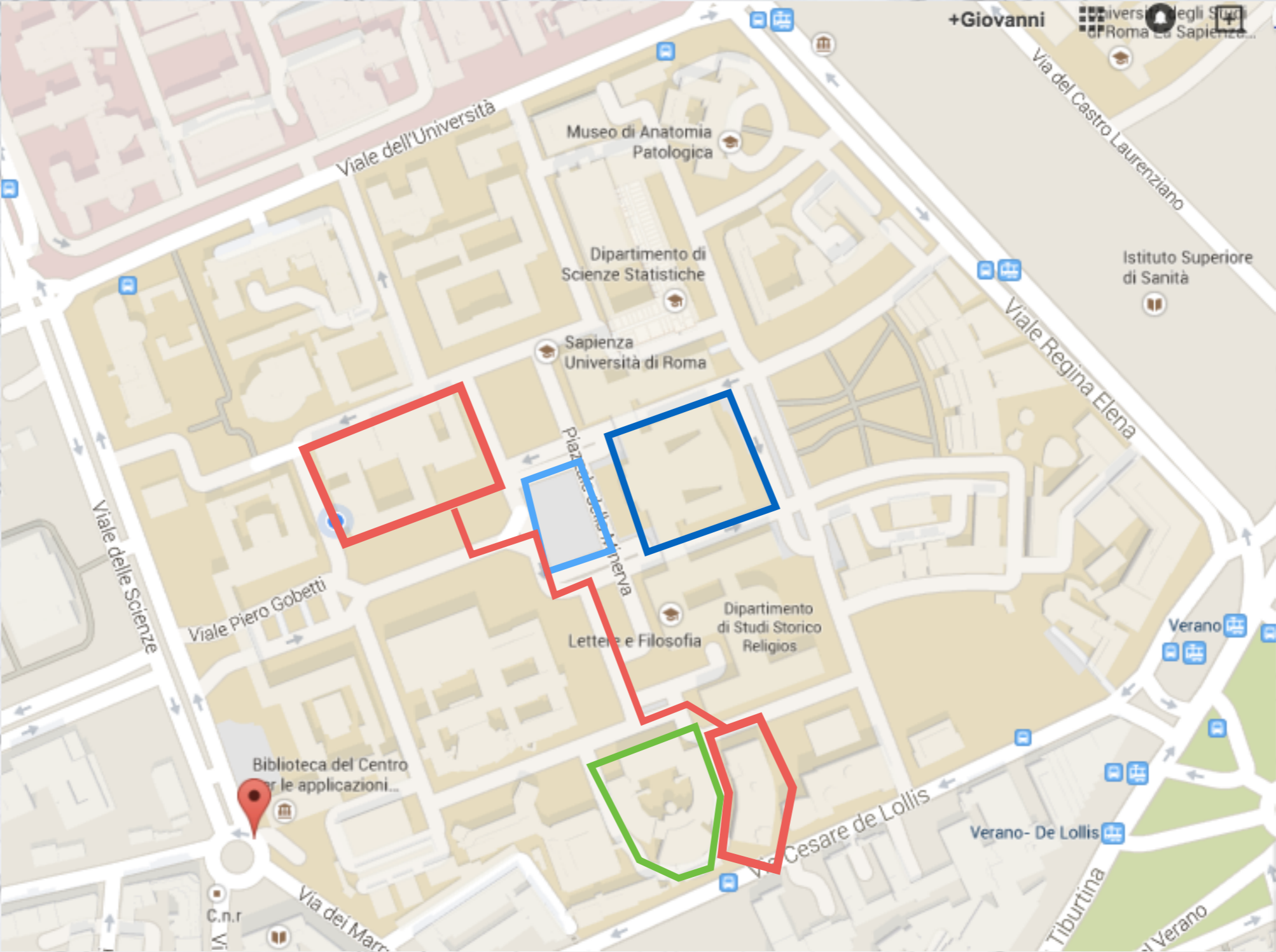




# DOVE SIAMO



# DOVE SIAMO



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