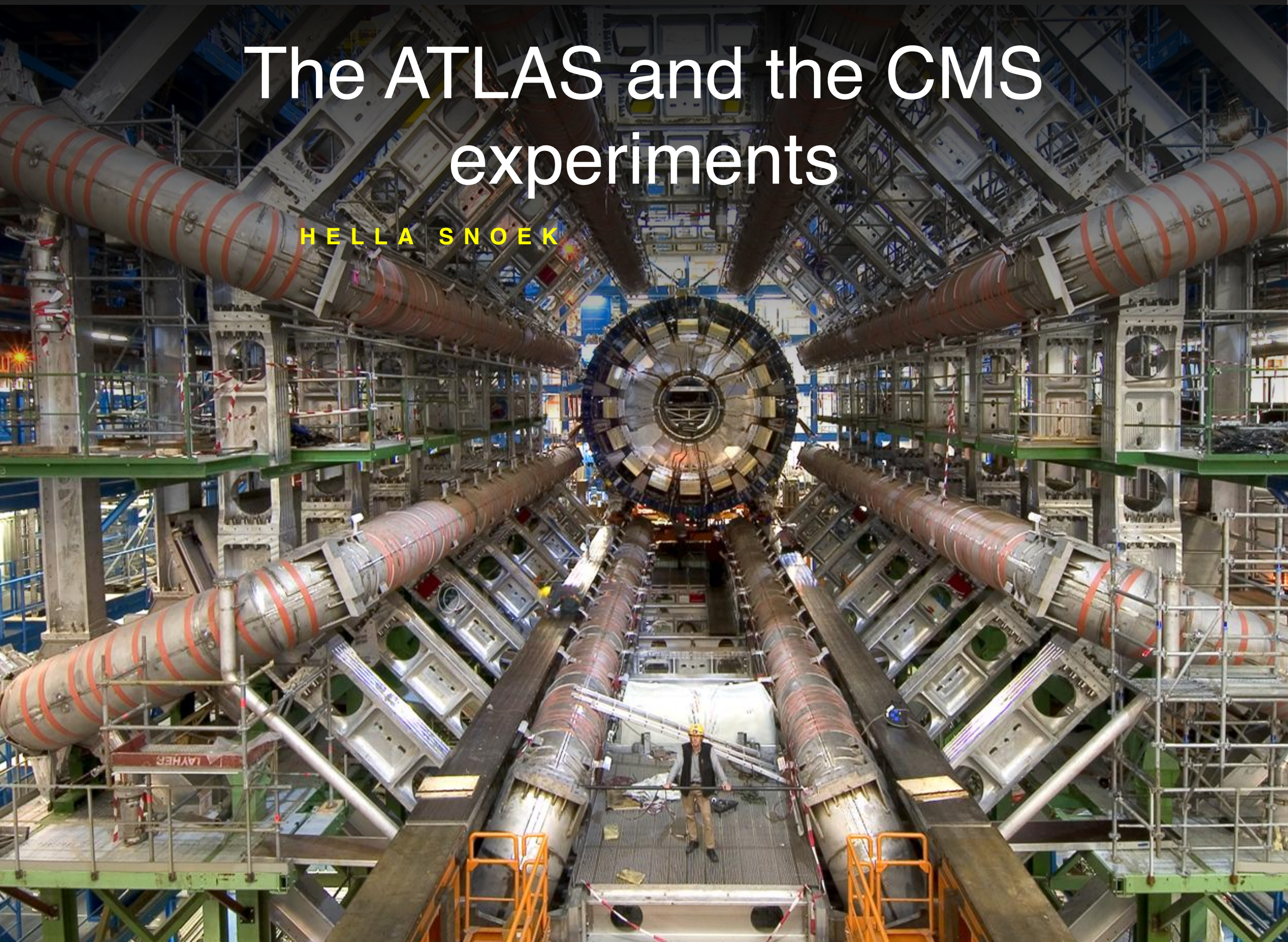
The ATLAS and the CMS experiments

HELLA SNOEK

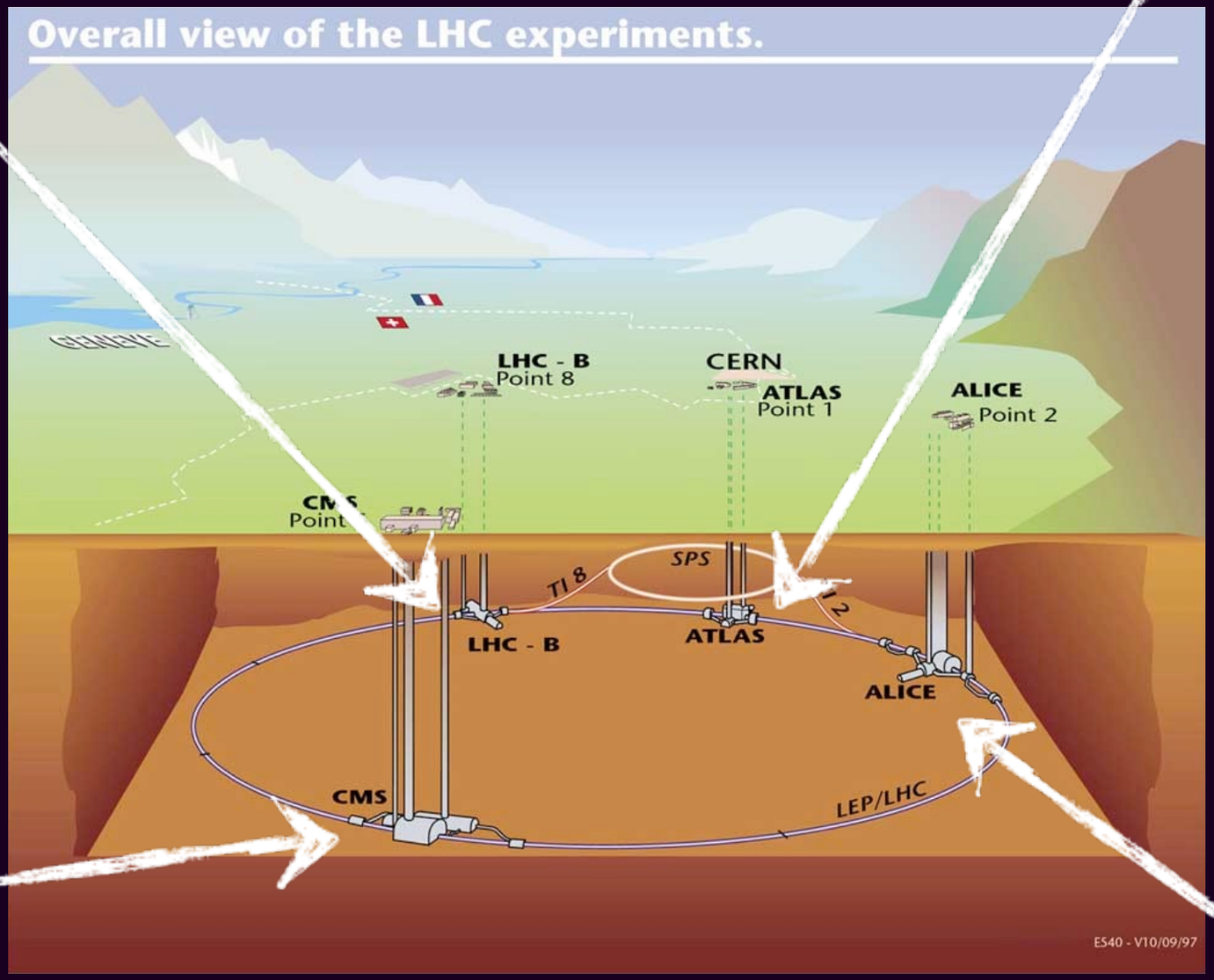


LHCb

–materie/anti-materie

ATLAS

–Higgs!
–Supersymmetrie
–materie/anti-materie
–exotische deeltjes
–ionen fysica
–donkere materie
– .....



CMS

–Higgs!
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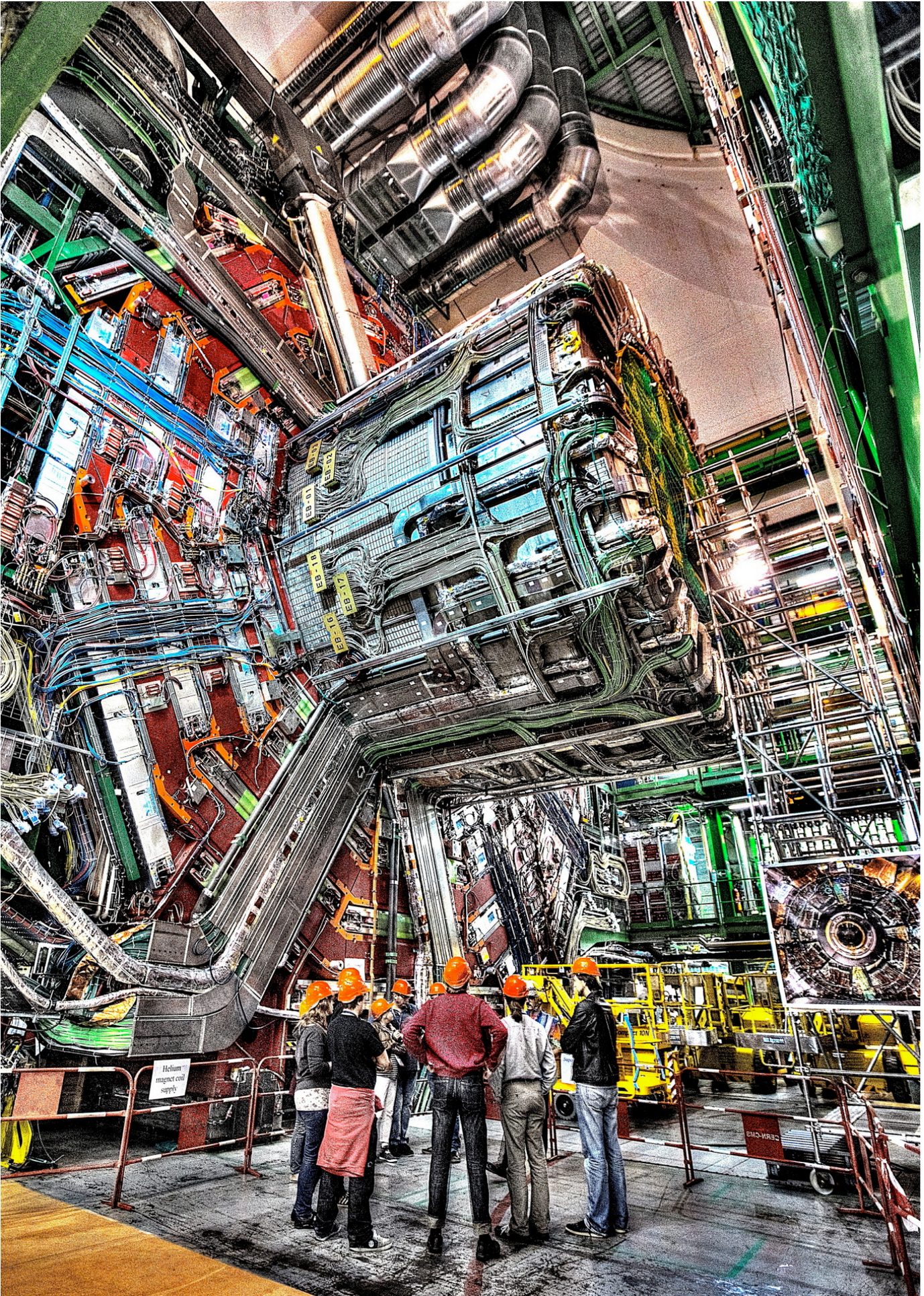
– .....

Alice

–ionen fysica



What is CMS?

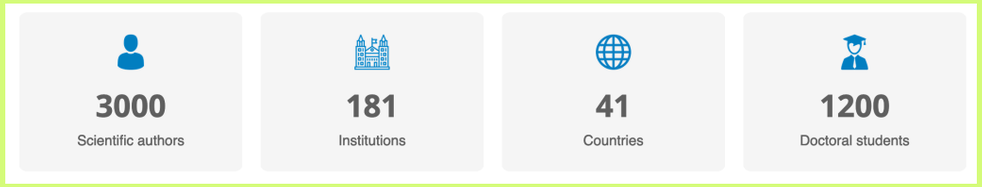
What is the ATLAS experiment?

CMS people

x 10

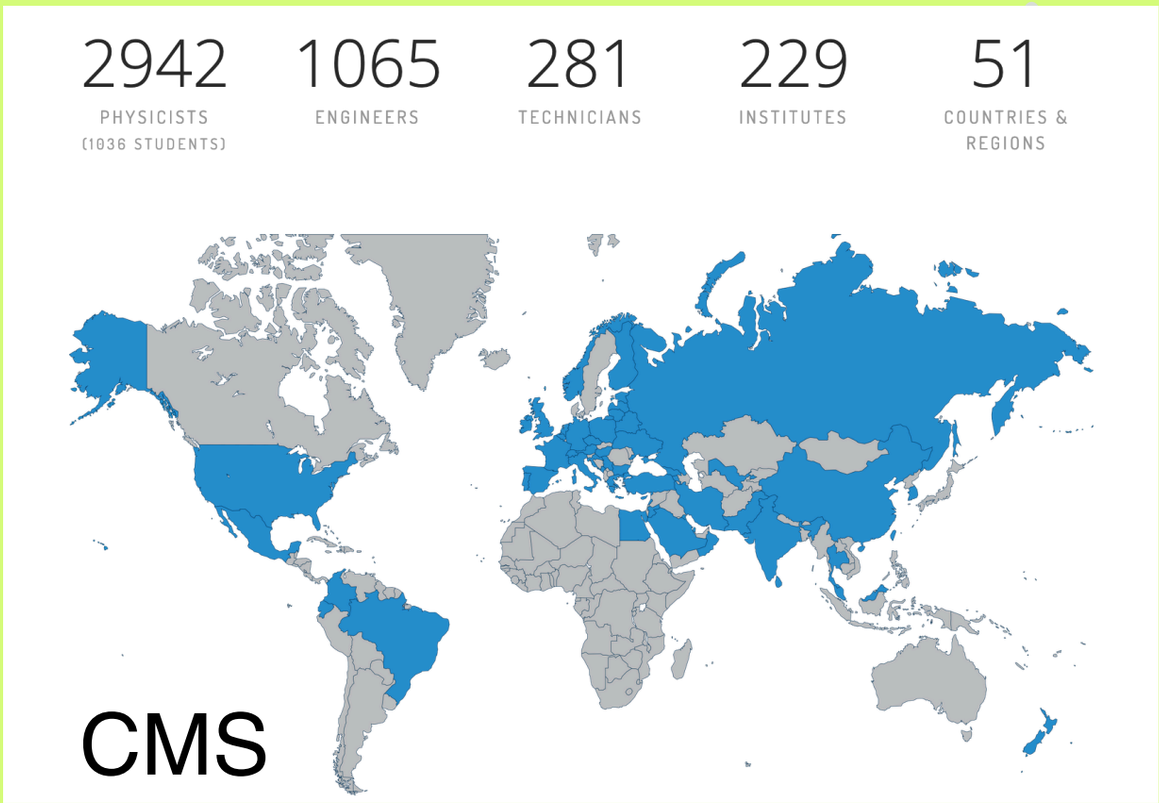
The people

Where are they?



Atlas

Who are they?



CMS

PhD@SLAC

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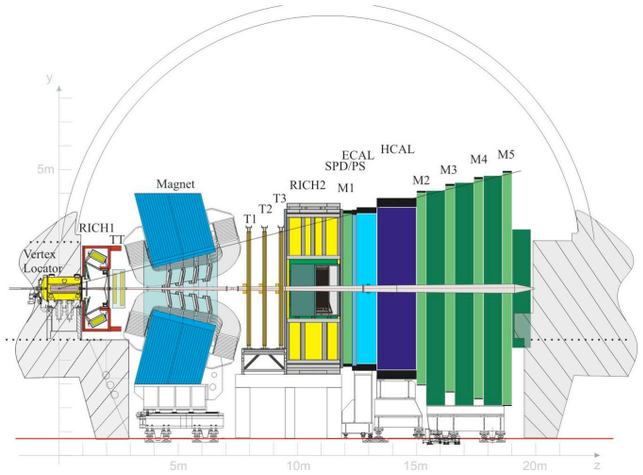
Postdoc@Nikhef

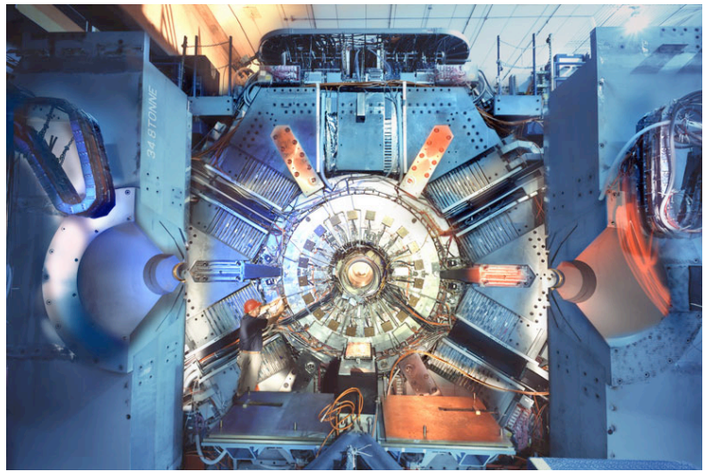
AssProf@UvA/Nikhef

Postdoc@CERN/UZH

Who am I?
(A Particle Physicist)

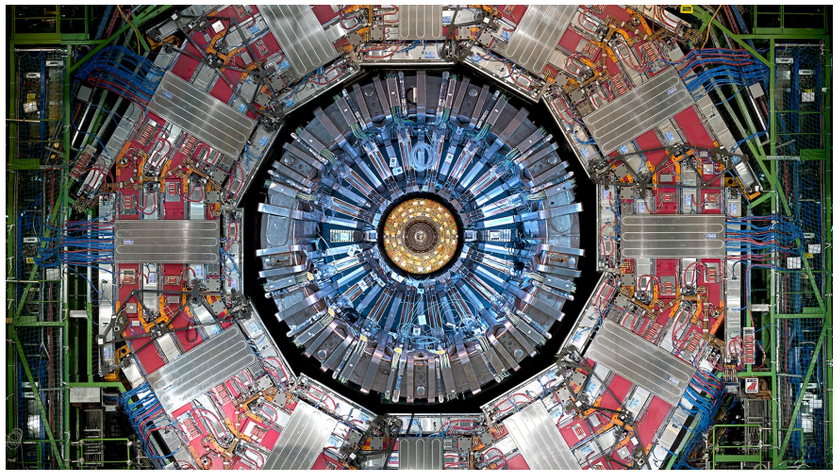


LHCb Master project

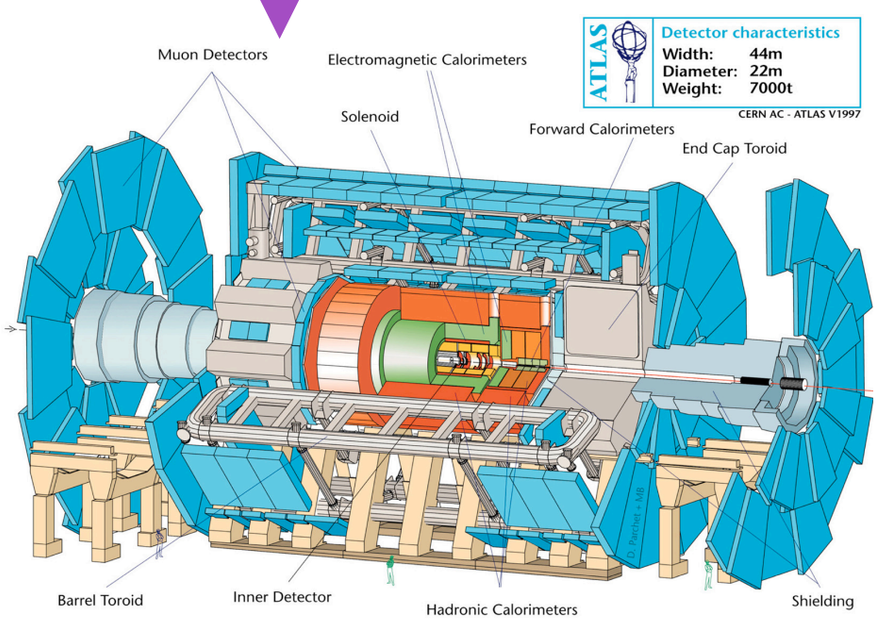


BaBar PhD

LHCb Postdoc2

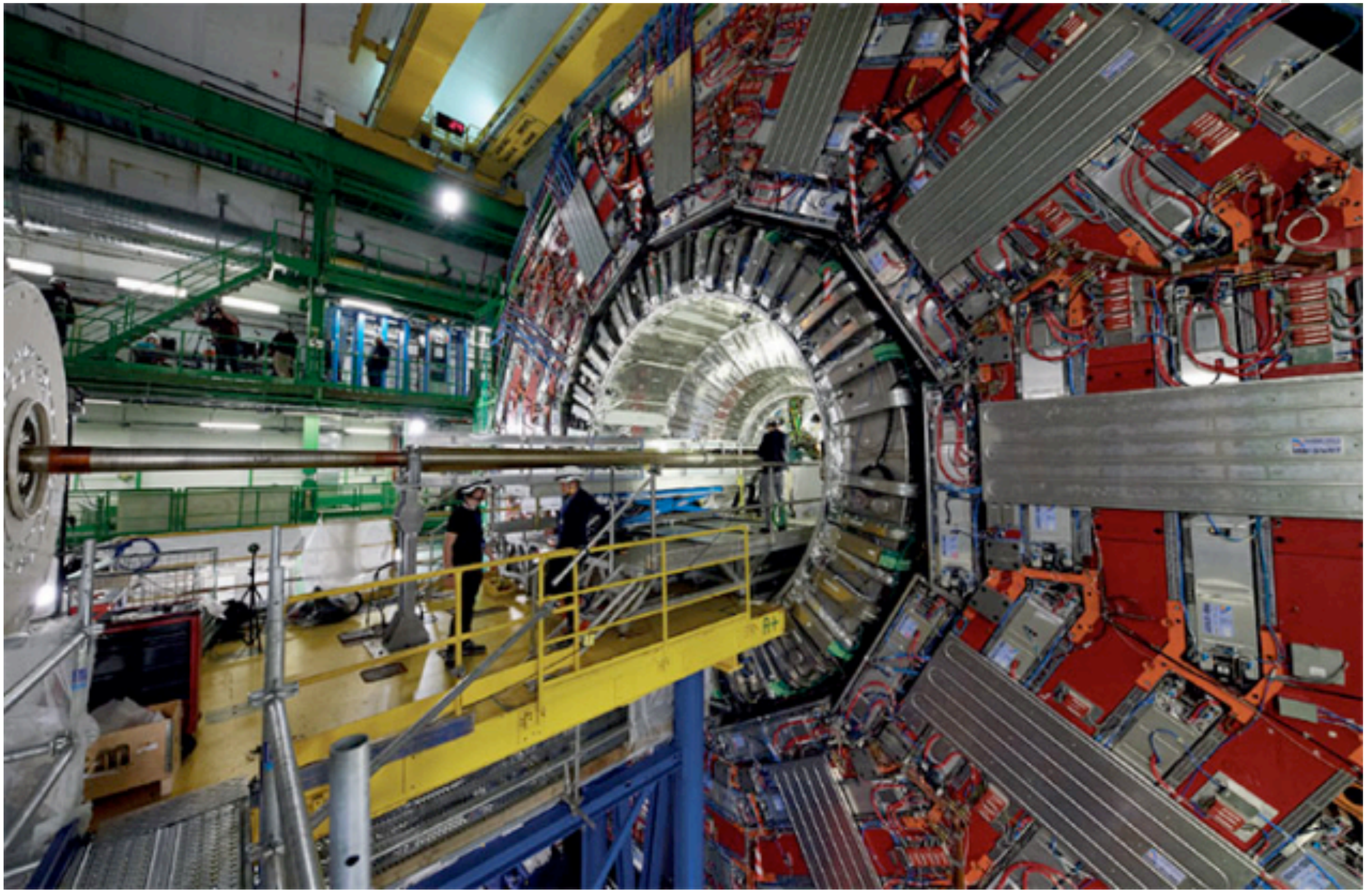


CMS Postdoc1

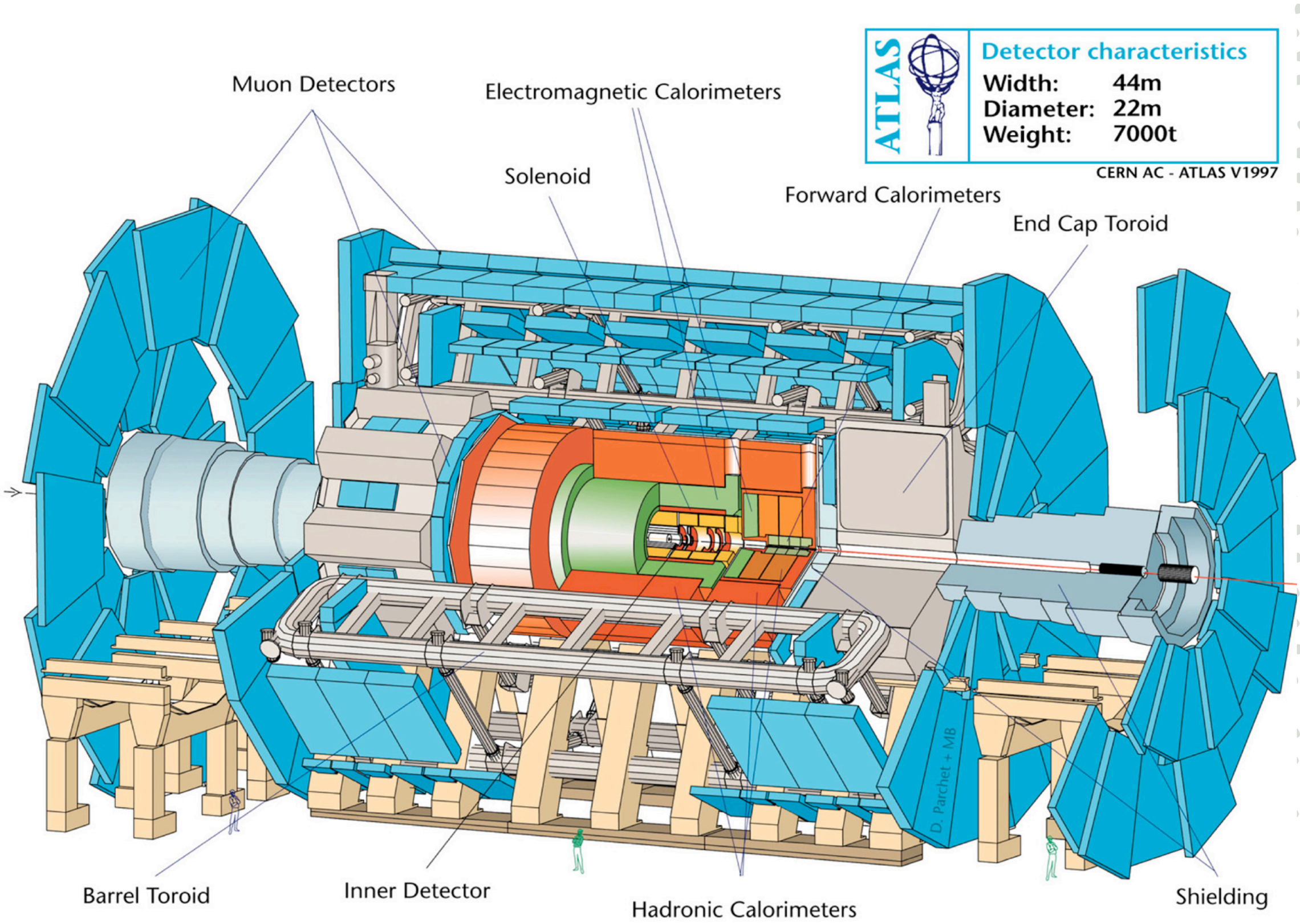


ATLAS now

Hoe bouw je zo’n gigantisch apparaat?



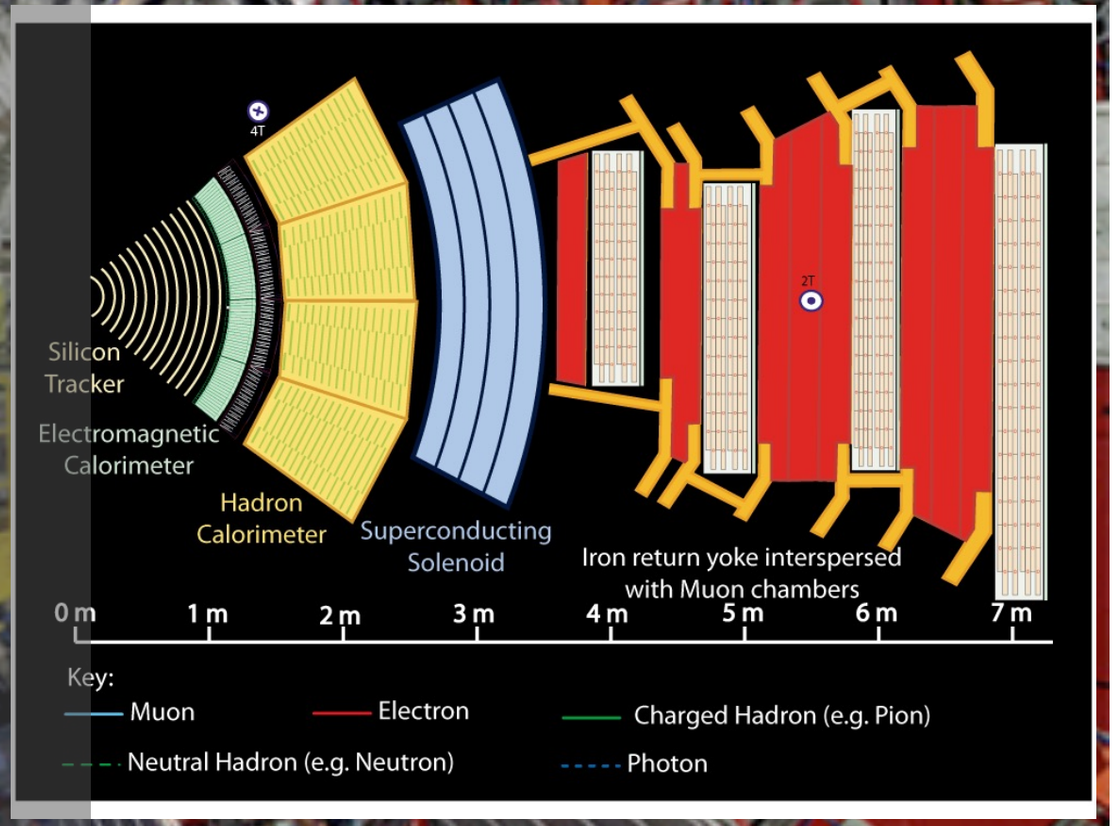
Hoe werkt het?

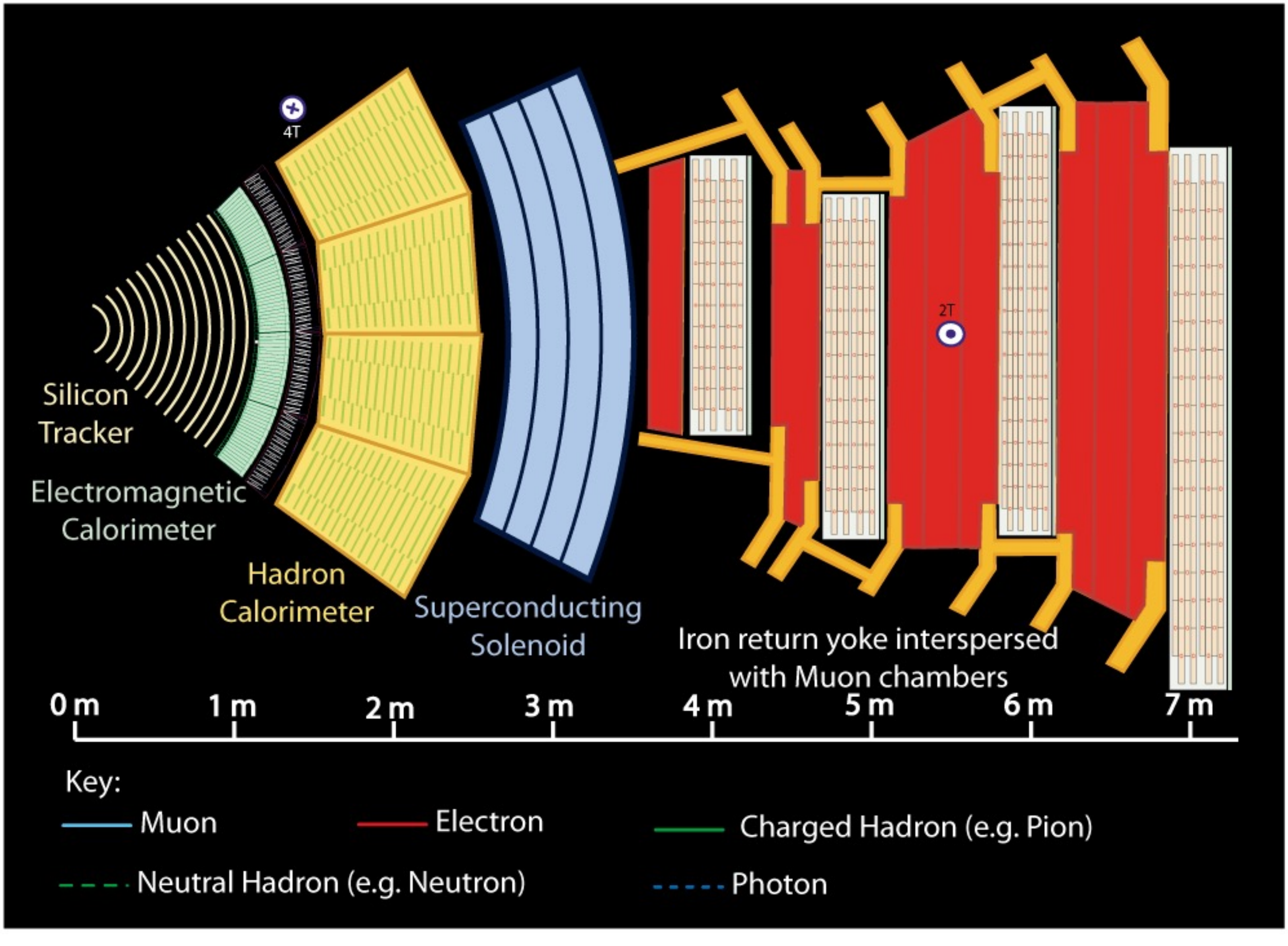


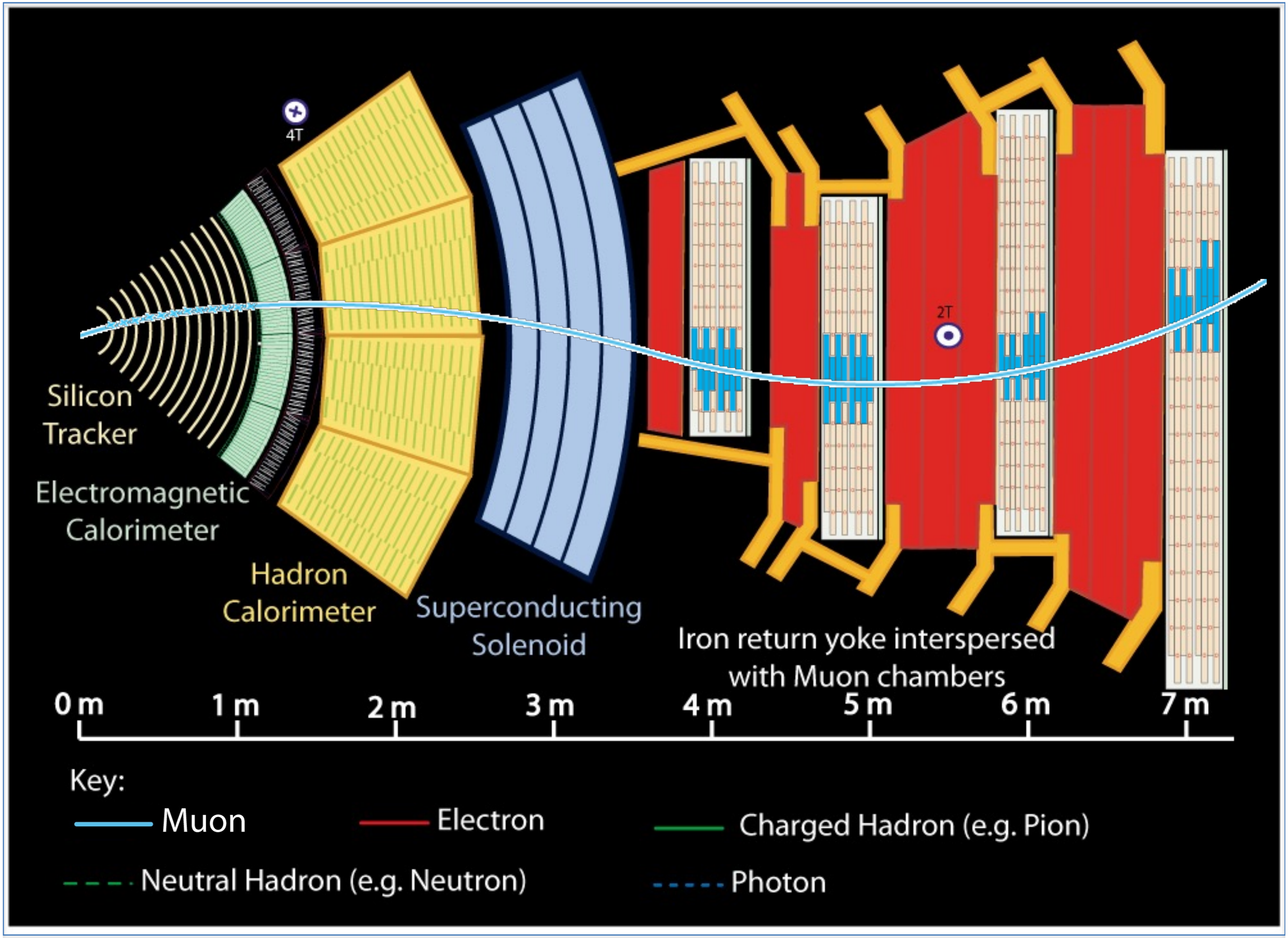
Hoe bouw je zo’n gigantisch apparaat?

Er zijn maar 7 stabiele deeltjes,
alle andere deeltjes ‘vervallen’ naar combinaties
van de stabiele deeltjes:

- electronen
- muonen
- protonen
- neutronen
- pionen
- neutrino’s
- fotonen




4T
2T
Silicon
Tracker
Electromagnetic
Calorimeter
Hadron
Calorimeter
Superconducting
Solenoid
Iron return yoke interspersed
with Muon chambers
0 m
1 m
2 m
3 m
4 m
5 m
6 m
7 m
Key:
Muon
Electron
Charged Hadron (e.g. Pion)
Neutral Hadron (e.g. Neutron)
Photon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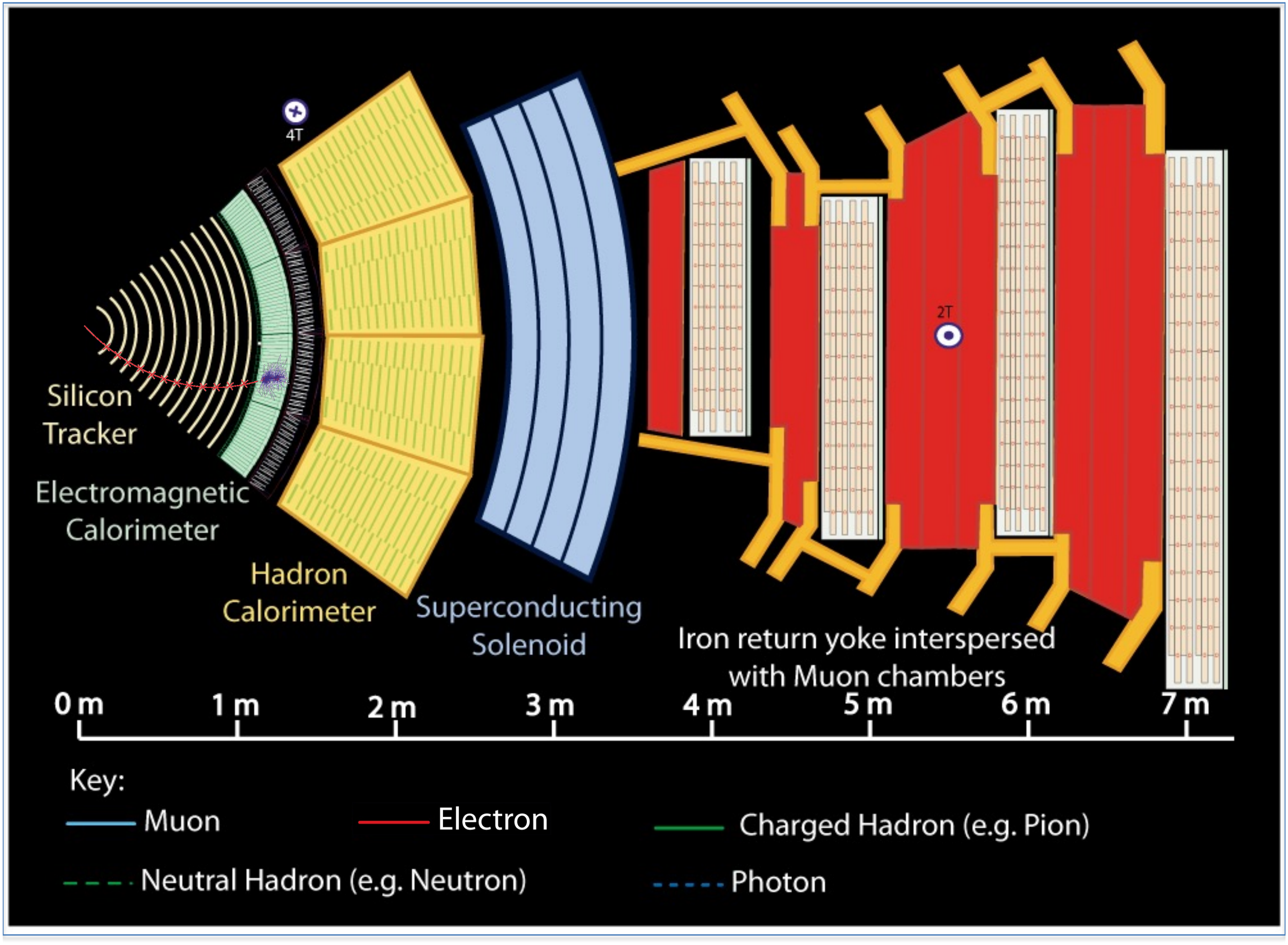
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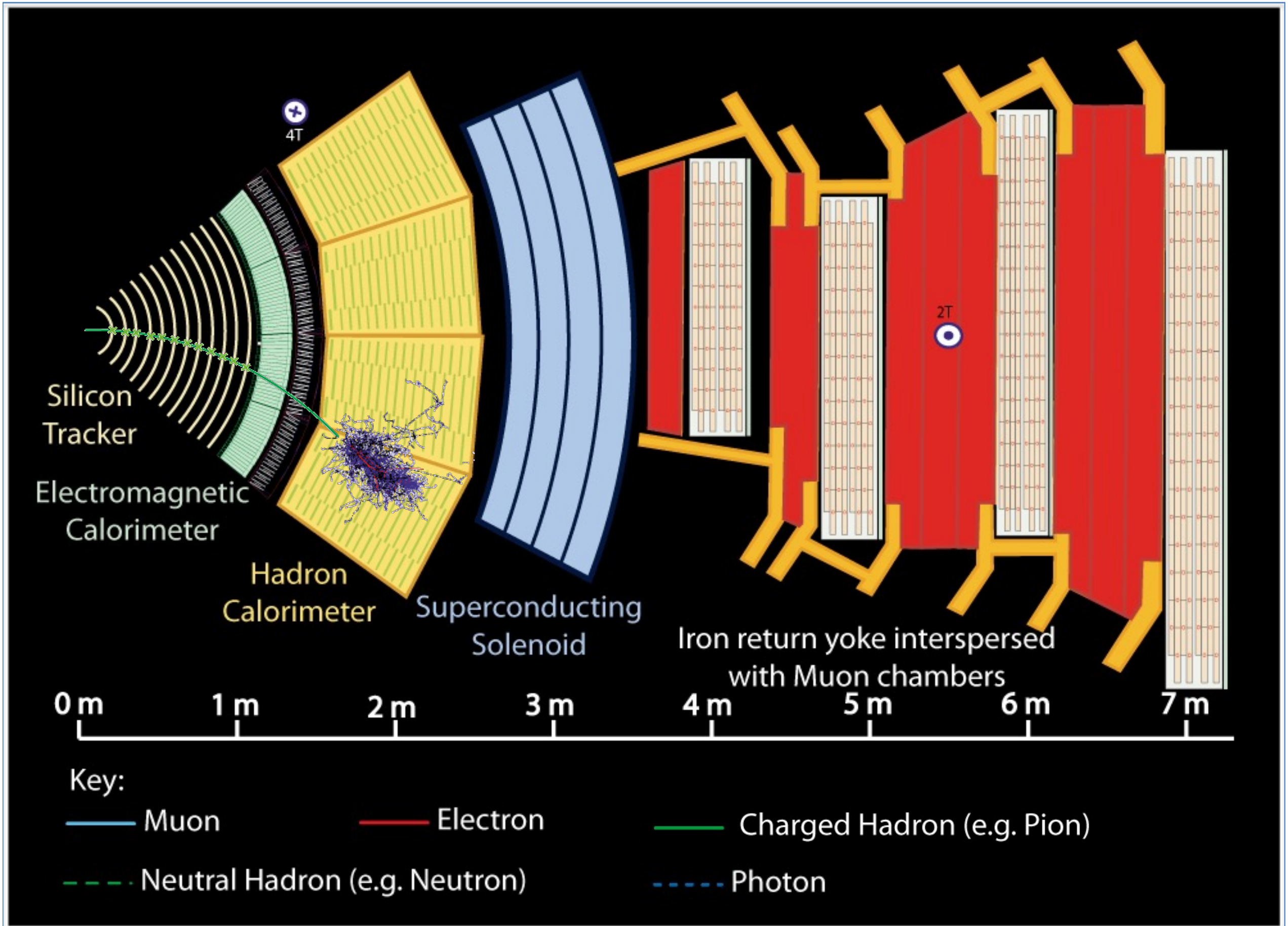
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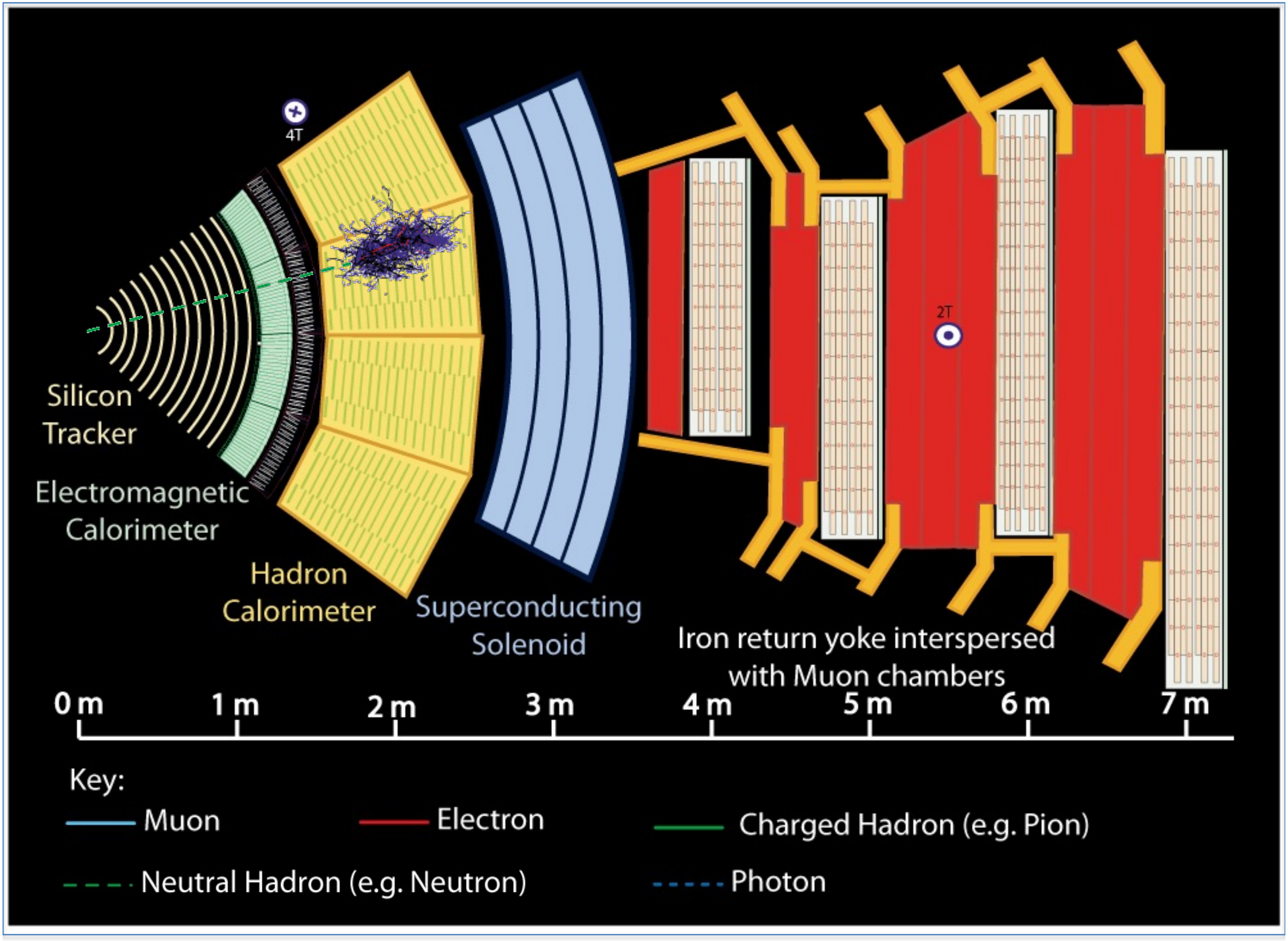
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Photon

Zit alles wel op de juiste plaats?

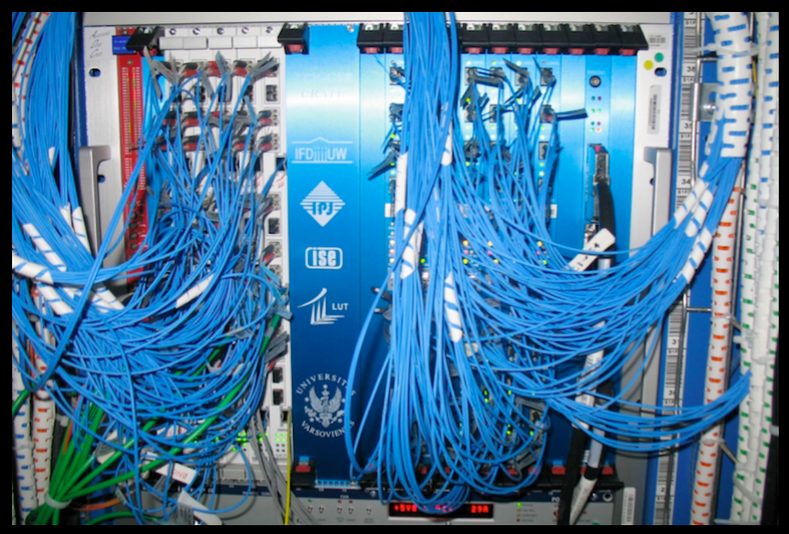
-kabeltjes

-stekkertjes

-schroefjes

-de sensoren

Trigger - wat slaan we op?

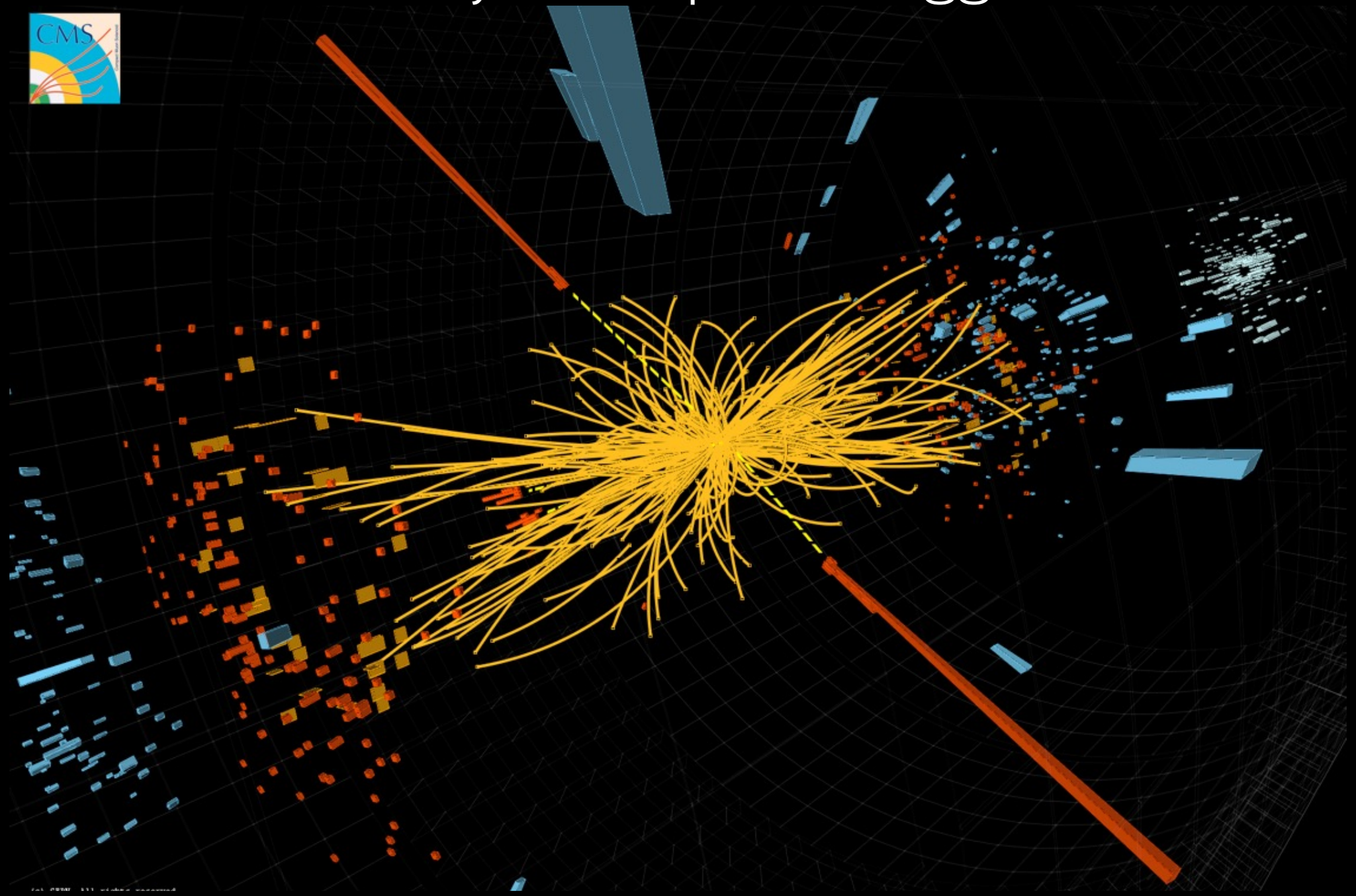


We nemen 1TB per seconde aan data(!).
17 botsingen x 40 MHz x 1.5 MB.

Maar we kunnen maximaal 100 Hz opslaan.

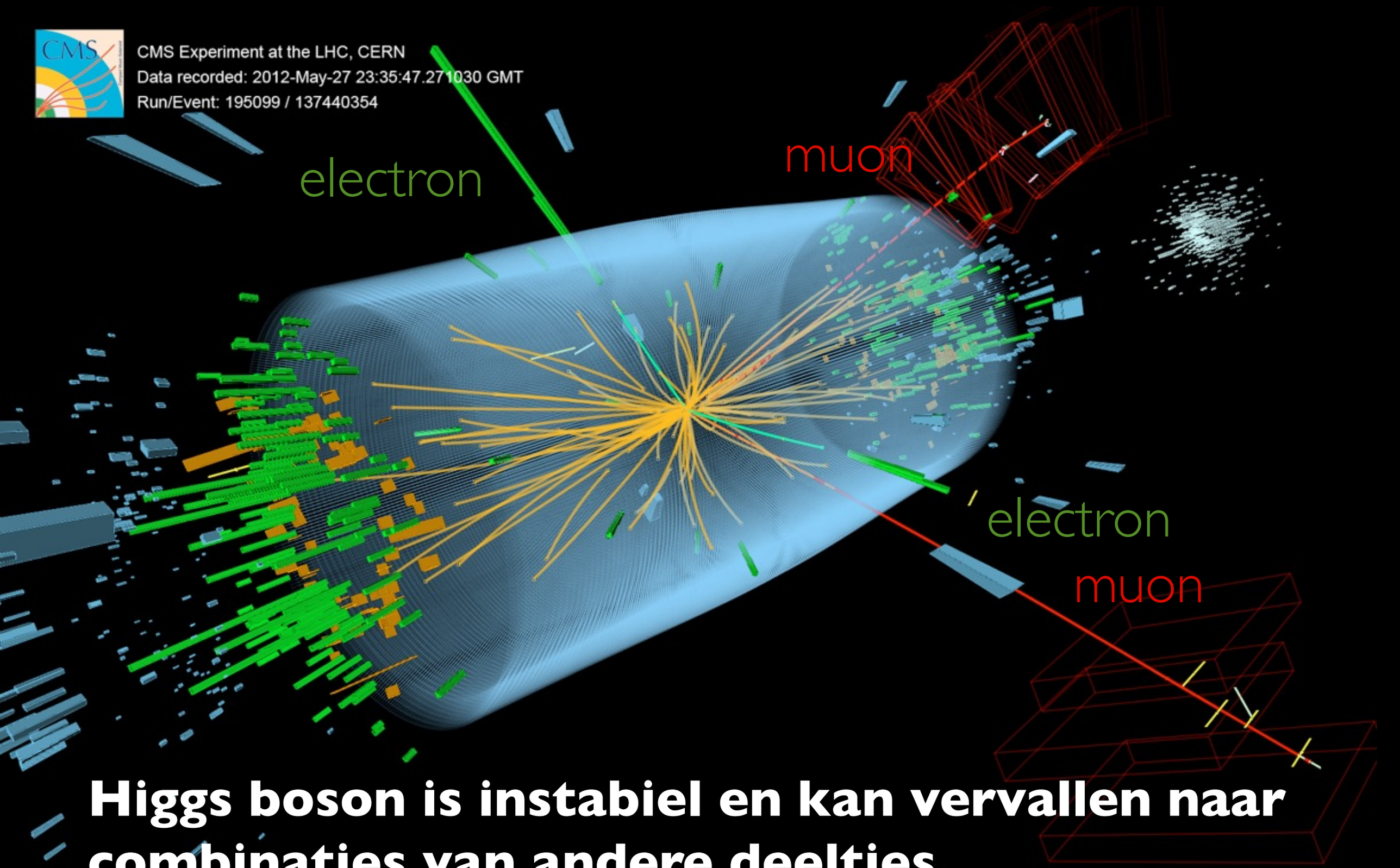
Welke botsingen willen we bewaren?

De jacht op de Higgs!



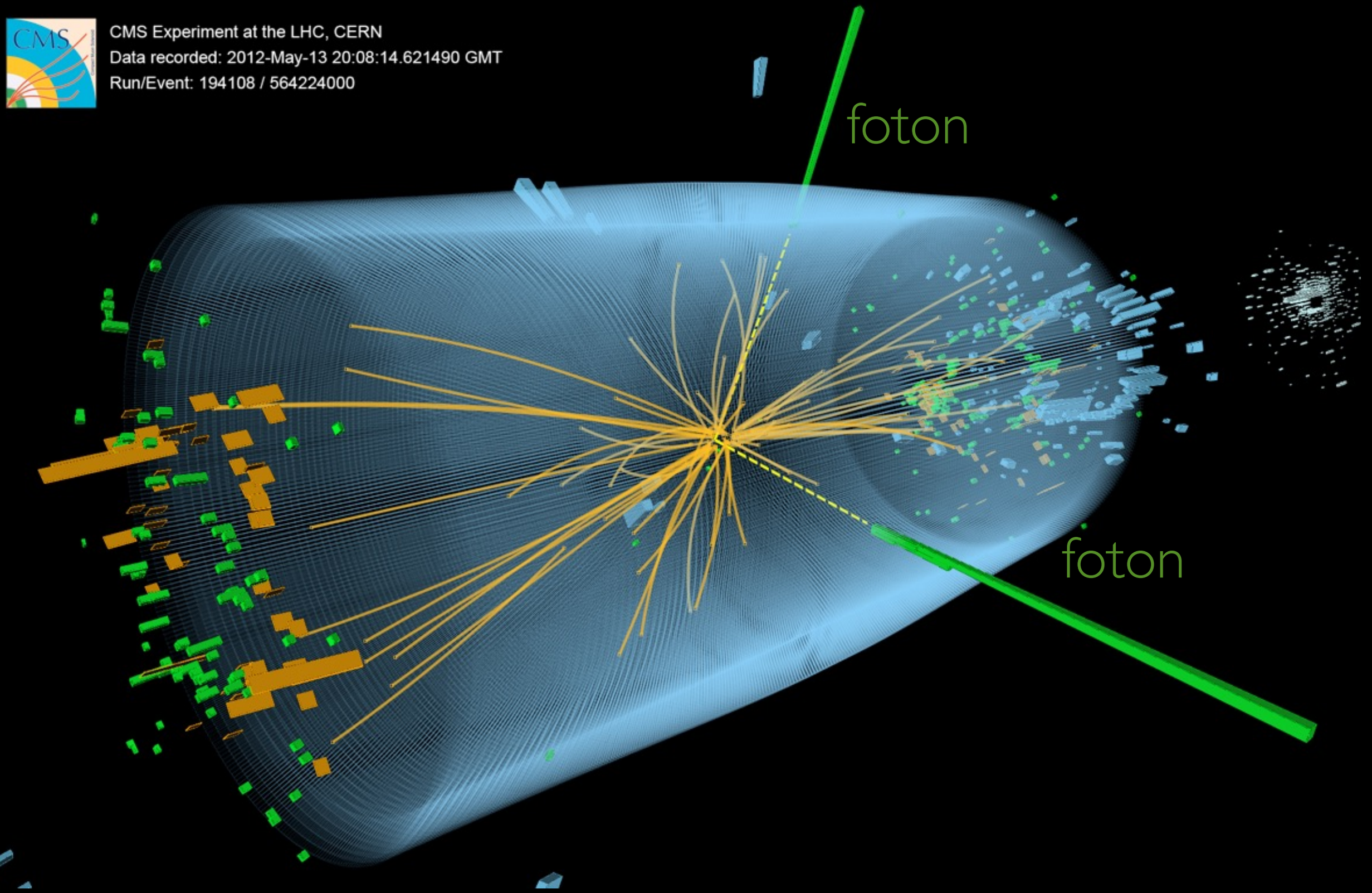
Higgs boson is instabiel en kan vervallen naar combinaties van andere deeltjes.

H→ZZ→2 muonen+2 electronen?

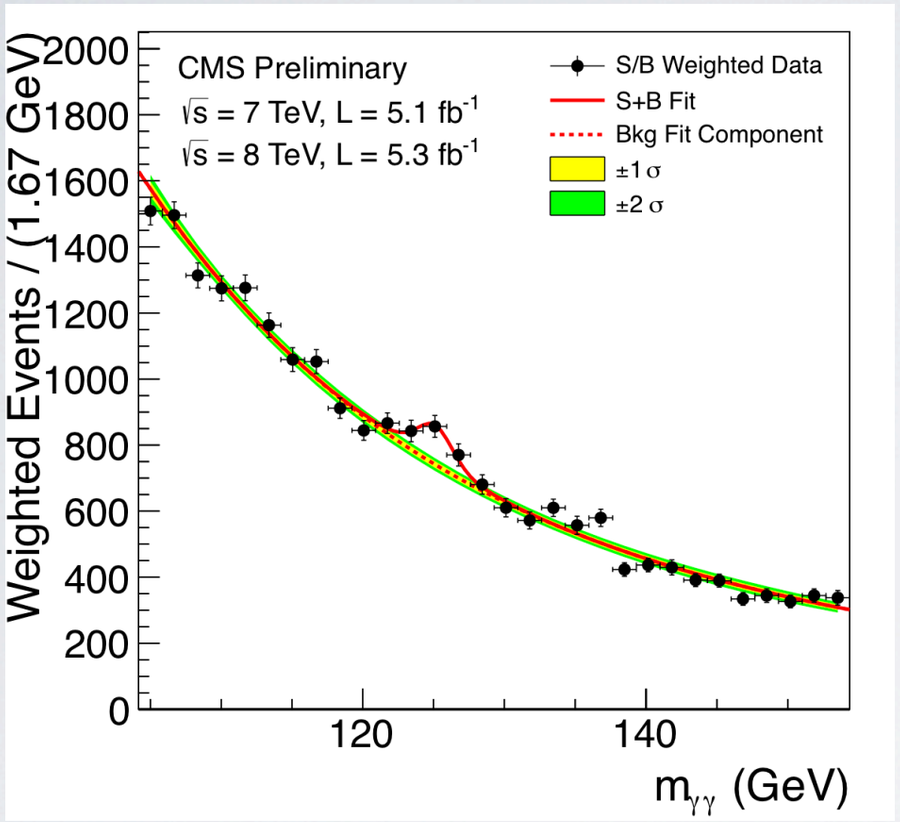


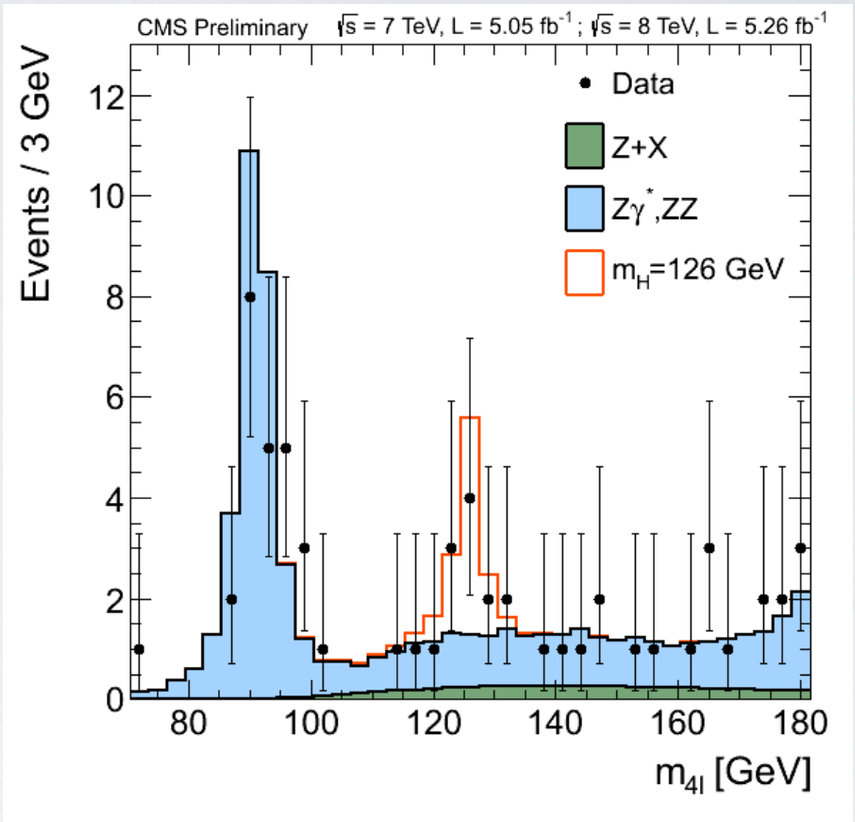
Higgs boson is instabiel en kan vervallen naar combinaties van andere deeltjes.

H→2 fotonen


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

Alle kandidaat botsingen



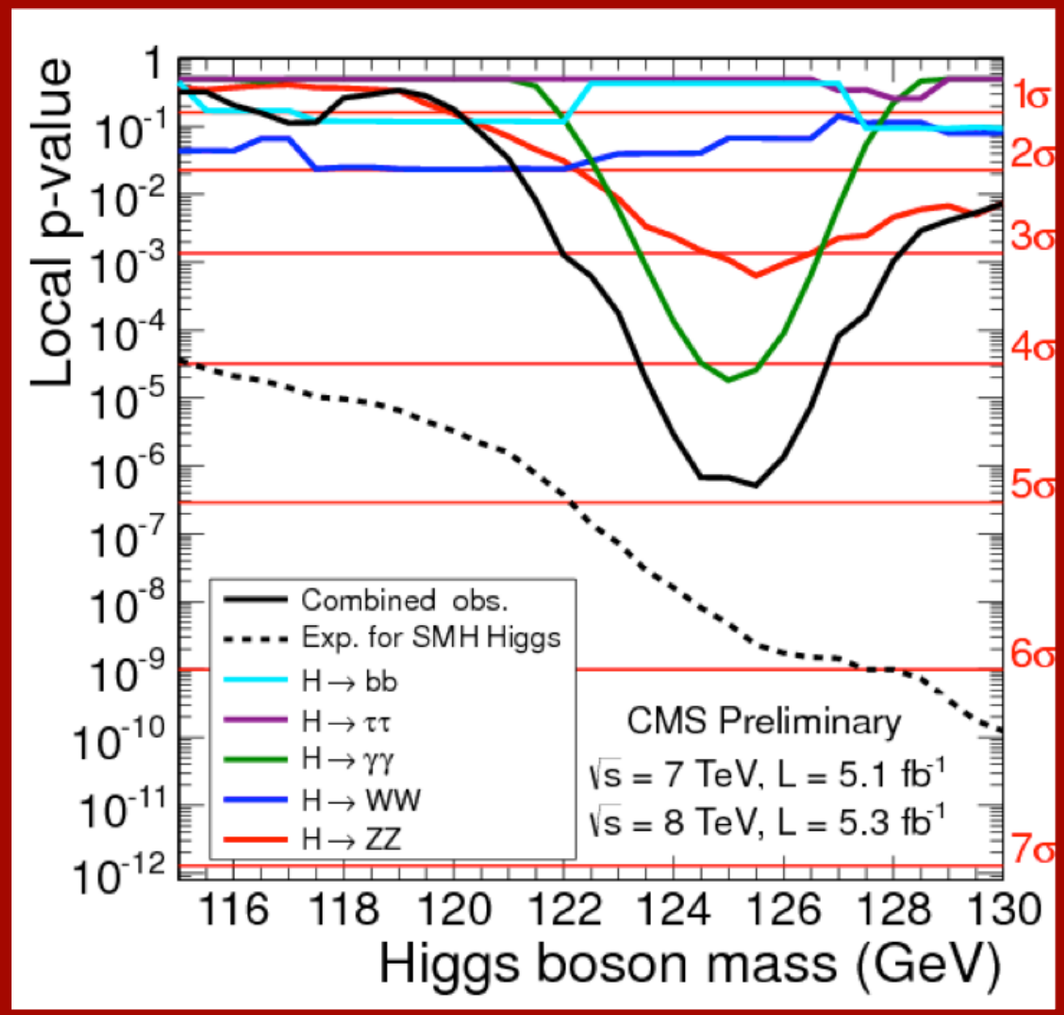


Heel veel botsingen lijken op een Higgs boson.

We simuleren onze verwachtingen en kijken of het overeen komt met wat we zien.

Alle kanalen samen

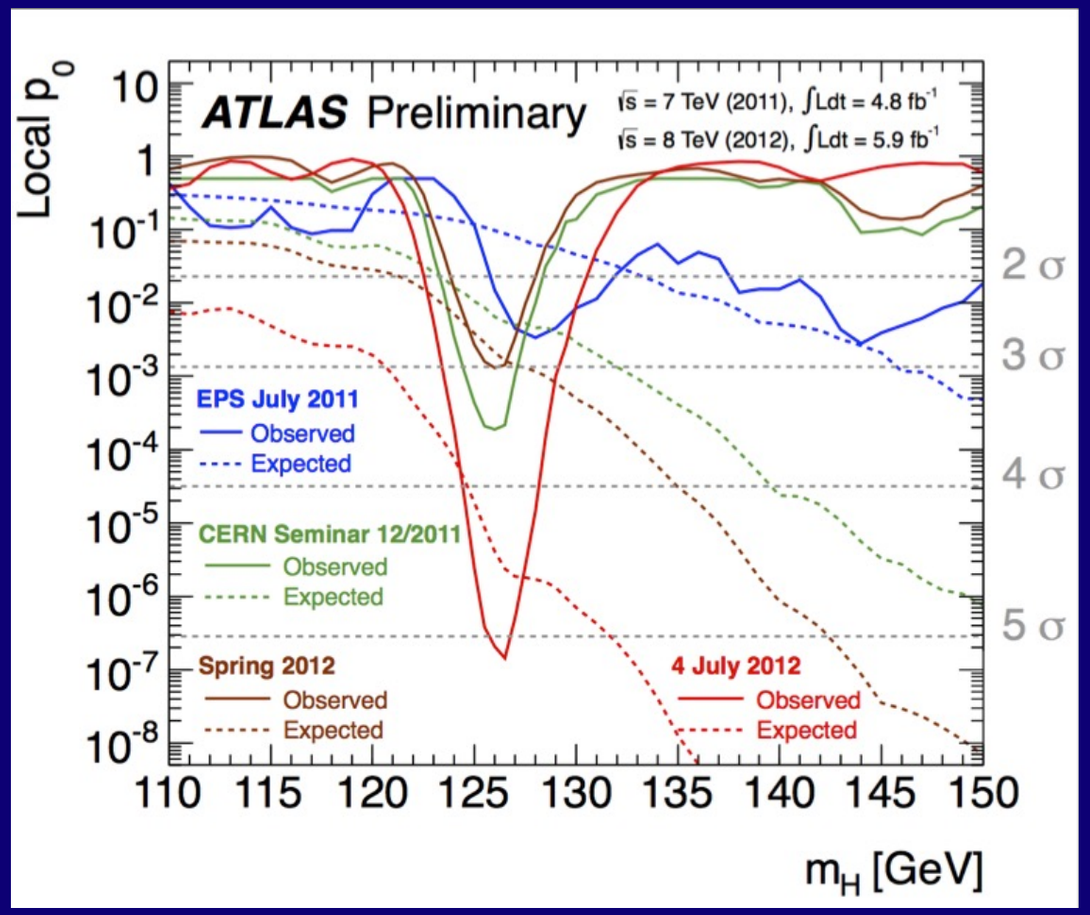
Waarschijnlijkheid

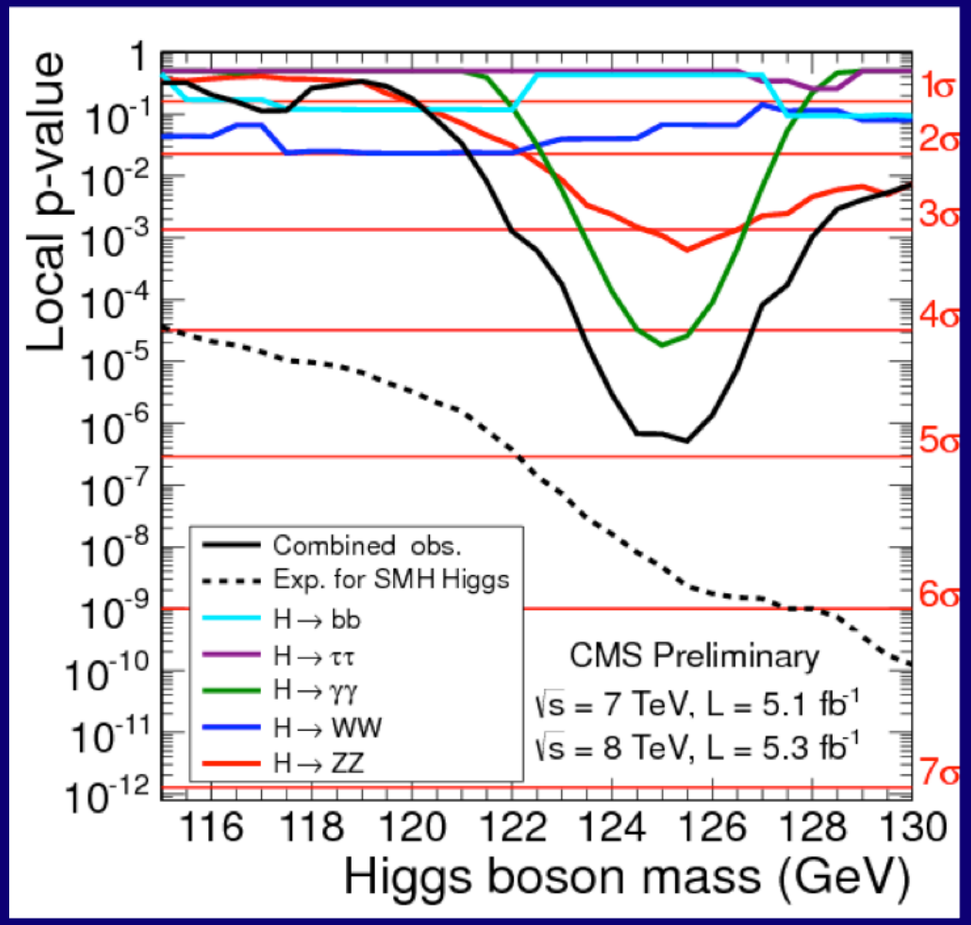


We hebben een Higgs gevonden met een massa van ongeveer 125 GeV (125x proton massa)*

*Een kans van 1 op 3.5 miljoen dat dit een toevallige samenloop is van waarnemingen zonder dat we er een Higgs op die massa bestaat.

Beide resultaten





Higgs gevonden!

LHCb

–materie/anti-materie

ATLAS

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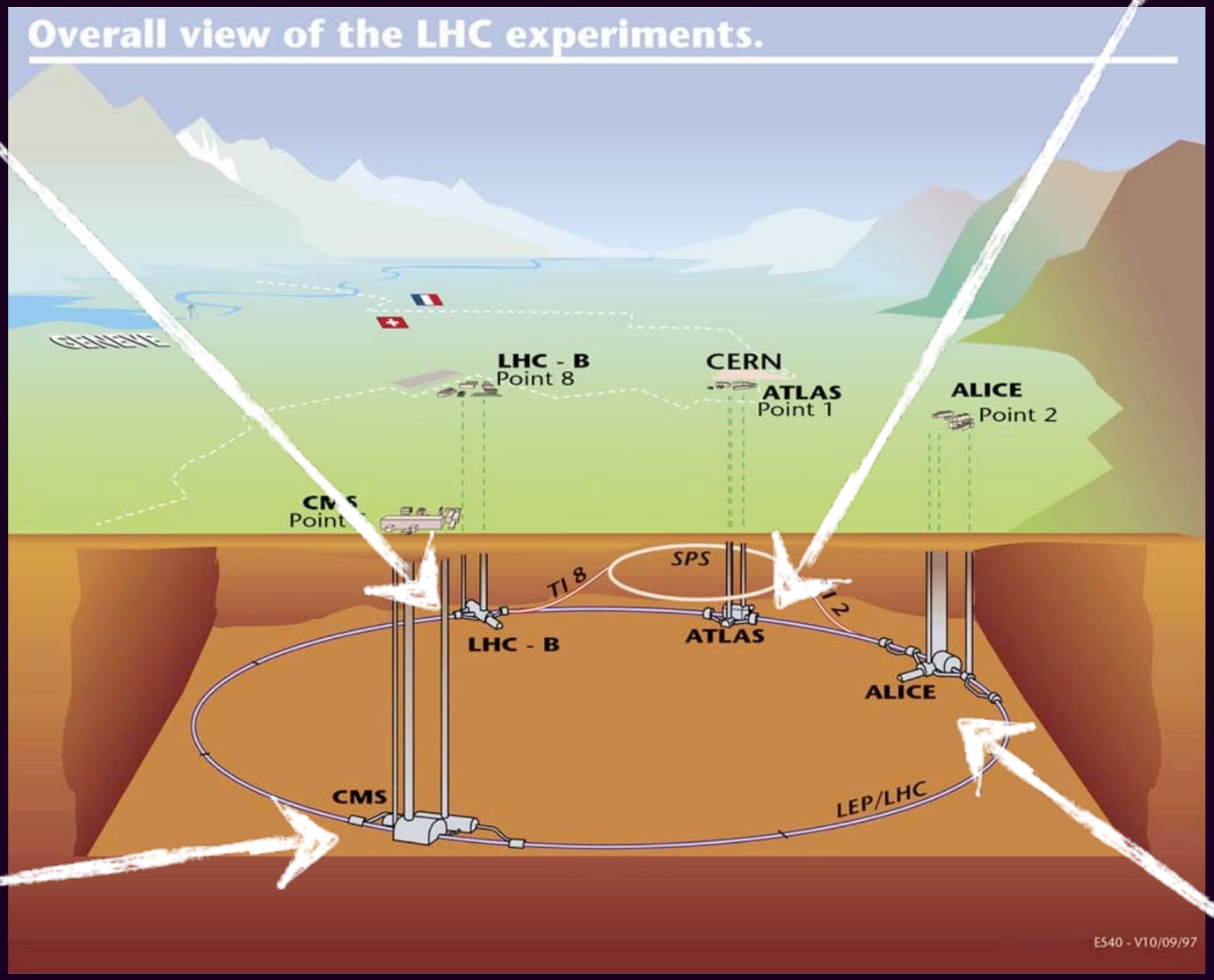


CMS

–Higgs!
–Supersymmetrie
–materie/anti-materie
–exotische deeltjes
–ionen fysica
–donkere materie
– .....

Alice

–ionen fysica

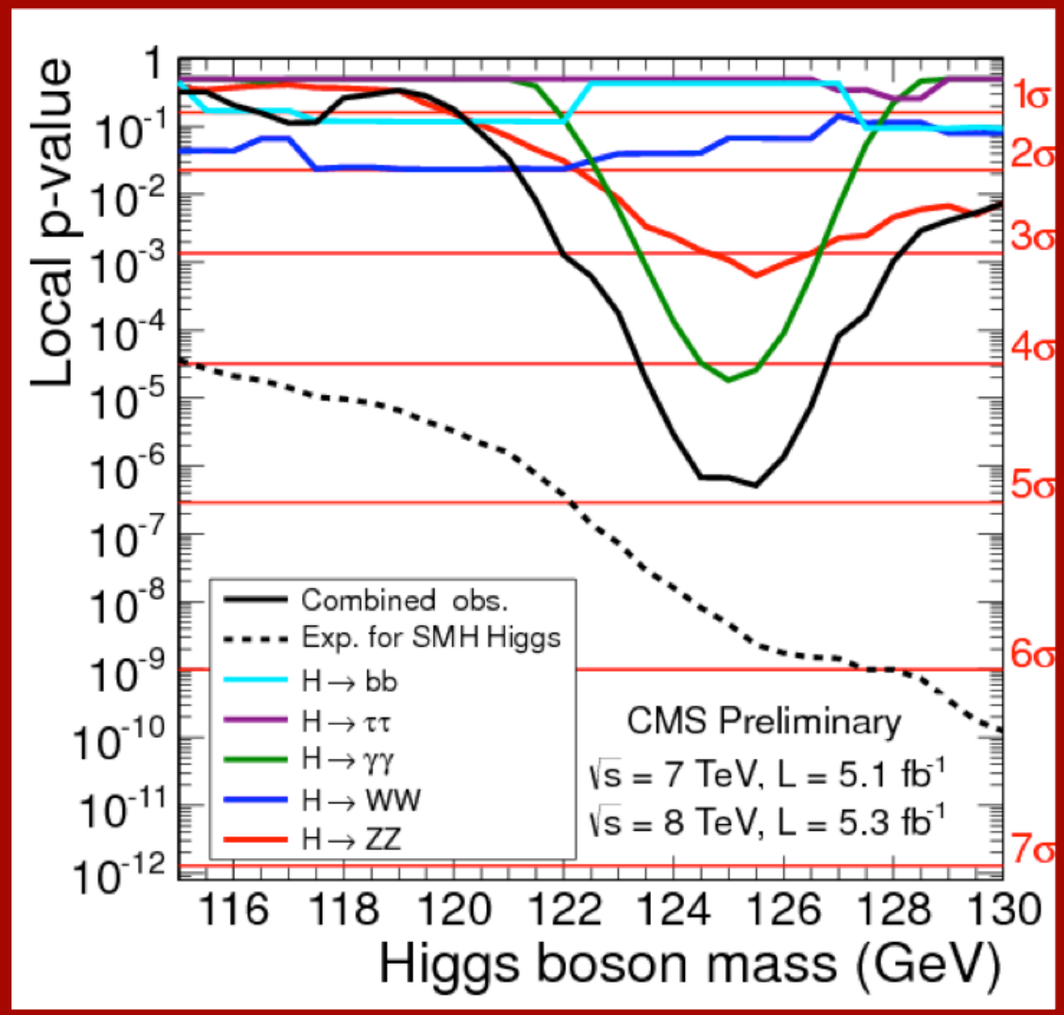
Amsterdam

en???

persconferentie 4 juli 2012

Alle kanalen samen

Waarschijnlijkheid



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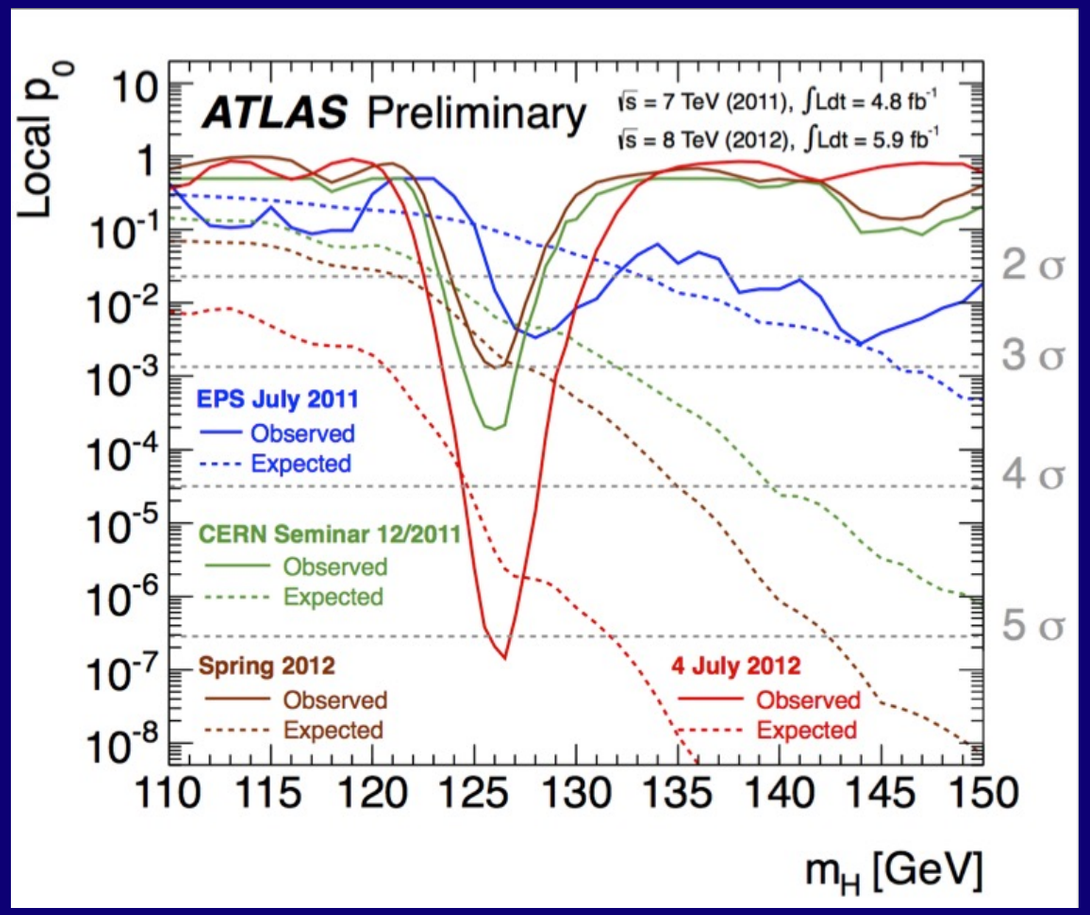
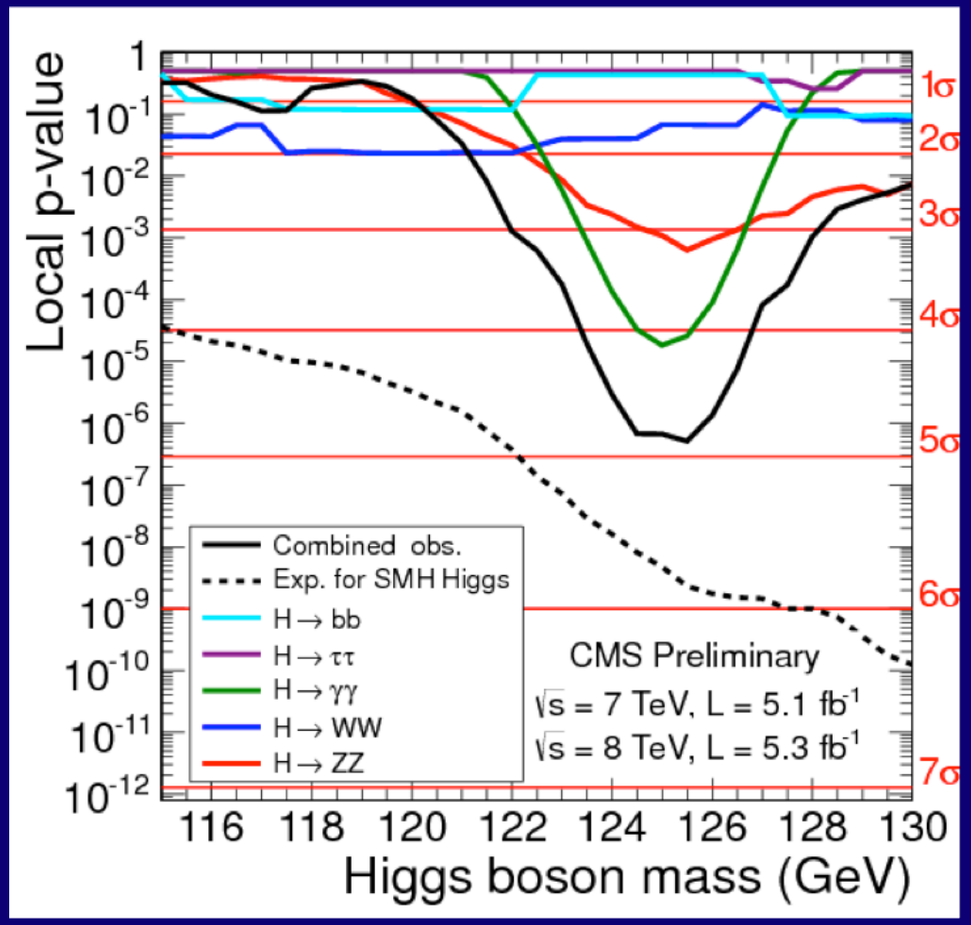




Higgs gevonden!

Laatste nieuws

Vandaag 14 maart 11:44

Volkskrant.nl

NIEUWS POLITIEK OPINIE BUITENLAND SPORT TECH & MEDIA VKSHO

BINNENLAND | CULTUUR | ECONOMIE | REIZEN | WETENSCHAP & GEZONDHEID | OPMERKELIJK

Bestaan Higgs-deeltje nu nog zekerder

Door: Marc Seijlhouwer – 14/03/13, 11:44

© AP. De deeltjesversneller in Zwitserland

Het bestaan van het inmiddels wereldberoemde Higgsdeeltje wordt steeds

VERWANT NIEUWS

Wetenschappers bijna zek
Higgs-boson inderdaad ge
06/03/13

Deeltjesversneller neemt t
pauze - 14/02/13

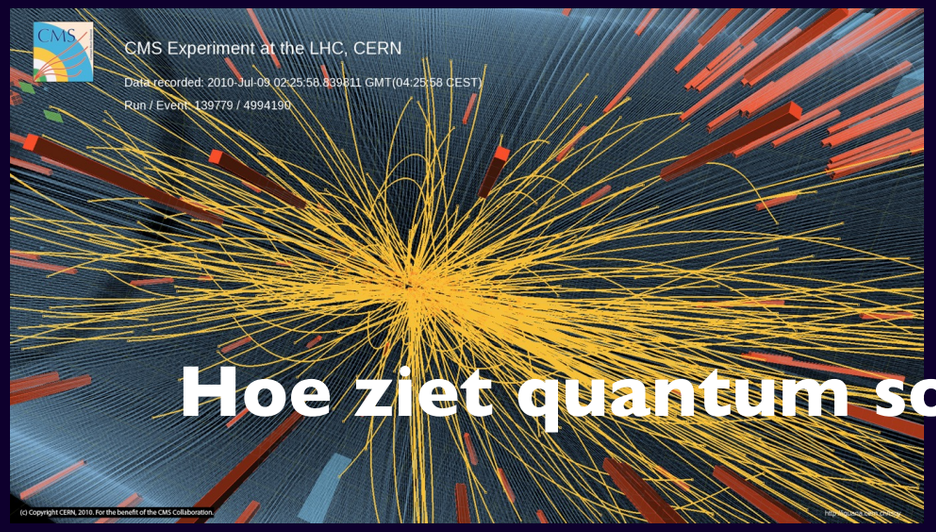
MEER OVER

Exacte wetenschappen | Wetenschap

De 'tractor beam' uit Star T
echt

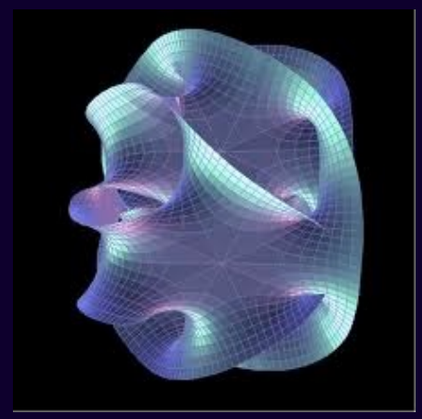
Lees nu de brieven van de

Natuurkunde onderzoek bij CMS



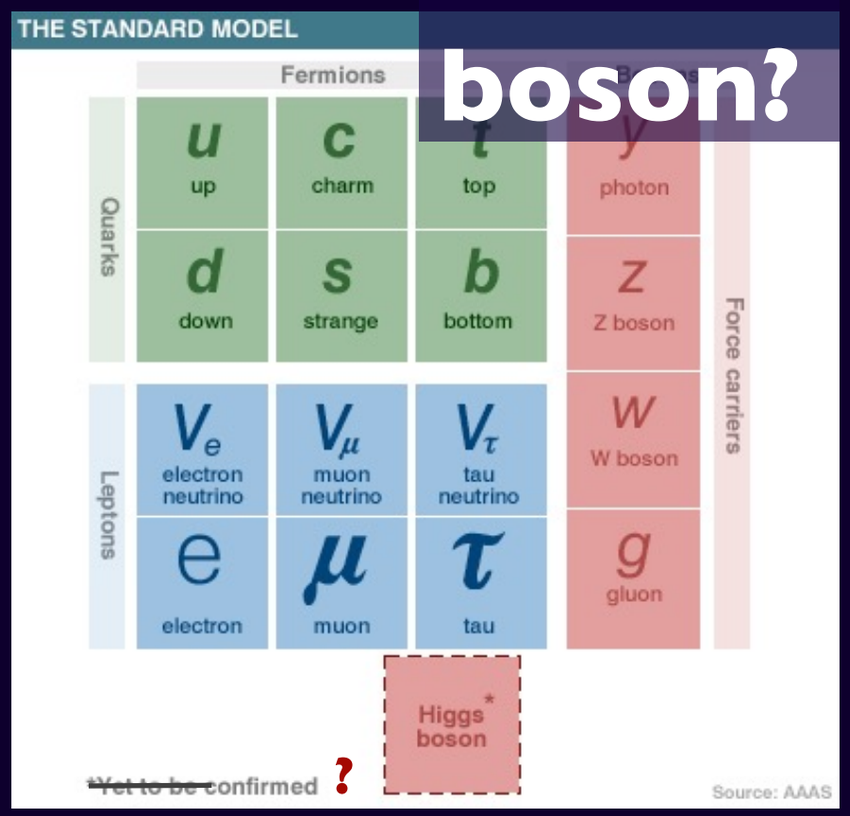
Hoe ziet quantum soep eruit?

3D - is dat alles?



Waar is de anti-materie gebleven?

Bestaat het Higgs boson?



Wat is donkere materie?

JHEP

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Transverse-momentum and pseudorapidity distributions of charged hadrons in pp collisions at $\sqrt{s} = 0.9$ and 2.36 TeV

CMS Collaboration

Abstract: Measurements of inclusive charged-hadron transverse-momentum and pseudorapidity distributions are presented for proton-proton collisions at $\sqrt{s} = 0.9$ and 2.36 TeV. The data were collected with the CMS detector during the LHC commissioning in December 2009. For non-single-diffractive interactions, the average charged-hadron transverse momentum is measured to be 0.46 ± 0.01 (stat.) $\pm$ 0.01 (syst.) GeV/c at 0.9 TeV and 0.50 ± 0.01 (stat.) $\pm$ 0.01 (syst.) GeV/c at 2.36 TeV, for pseudorapidities between -2.4 and $+2.4$. At these energies, the measured pseudorapidity densities in the central region, $dN_{\mathrm{ch}}/d\eta|_{|\eta|<0.5}$, are 3.48 ± 0.02 (stat.) $\pm$ 0.13 (syst.) and 4.47 ± 0.04 (stat.) $\pm$ 0.16 (syst.), respectively. The results at 0.9 TeV are in agreement with previous measurements and confirm the expectation of near equal hadron production in $\mathrm{p\bar{p}}$ and pp collisions. The results at 2.36 TeV represent the highest-energy measurements at a particle collider to date.

Keywords: Hadron-Hadron Scattering

ArXiv ePrint: 1002.0621

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Eerste publicatie

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