

Masterclass 2025 - Laboratori Nazionali di Frascati

3 - 7 marzo 2025

*Spettro di Brocken,
Agosto 2019
Australia orientale*

Rivelatori di particelle

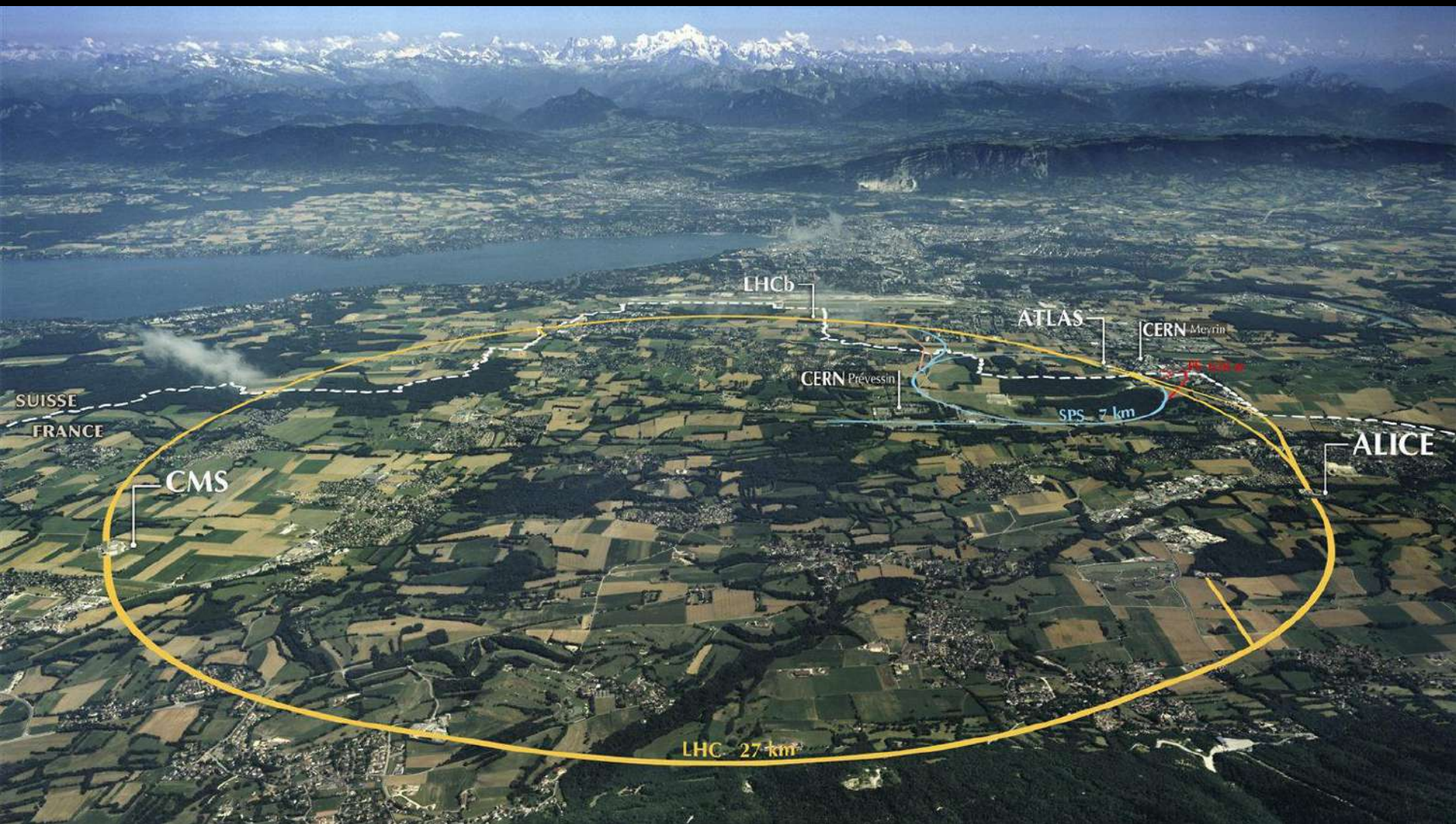


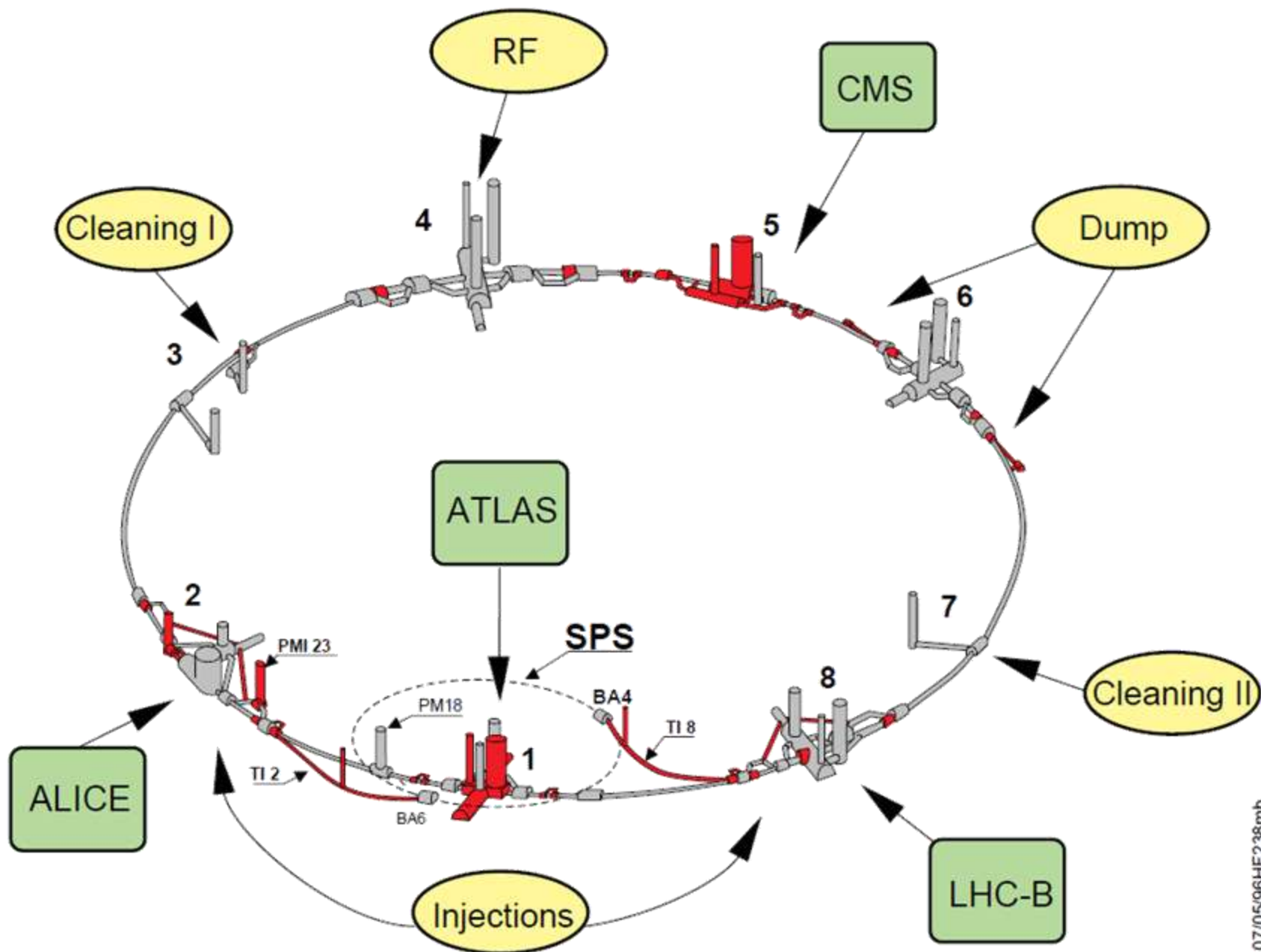
Istituto Nazionale di Fisica Nucleare
LABORATORI NAZIONALI DI FRASCATI

Barbara Sciascia (INFN)

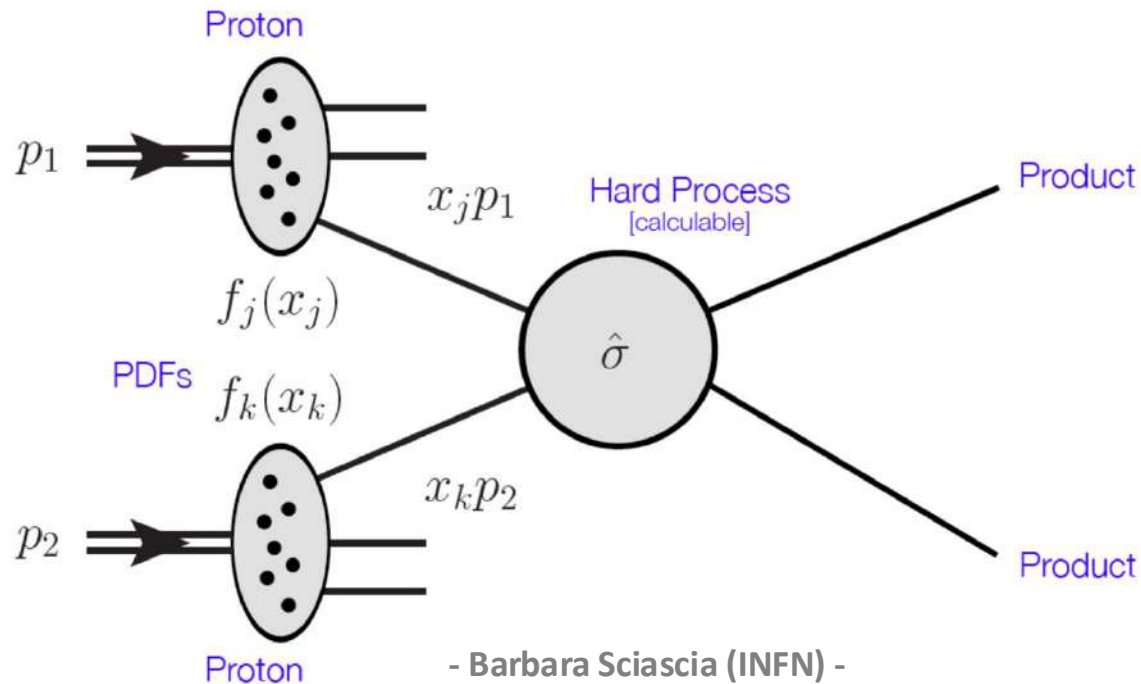
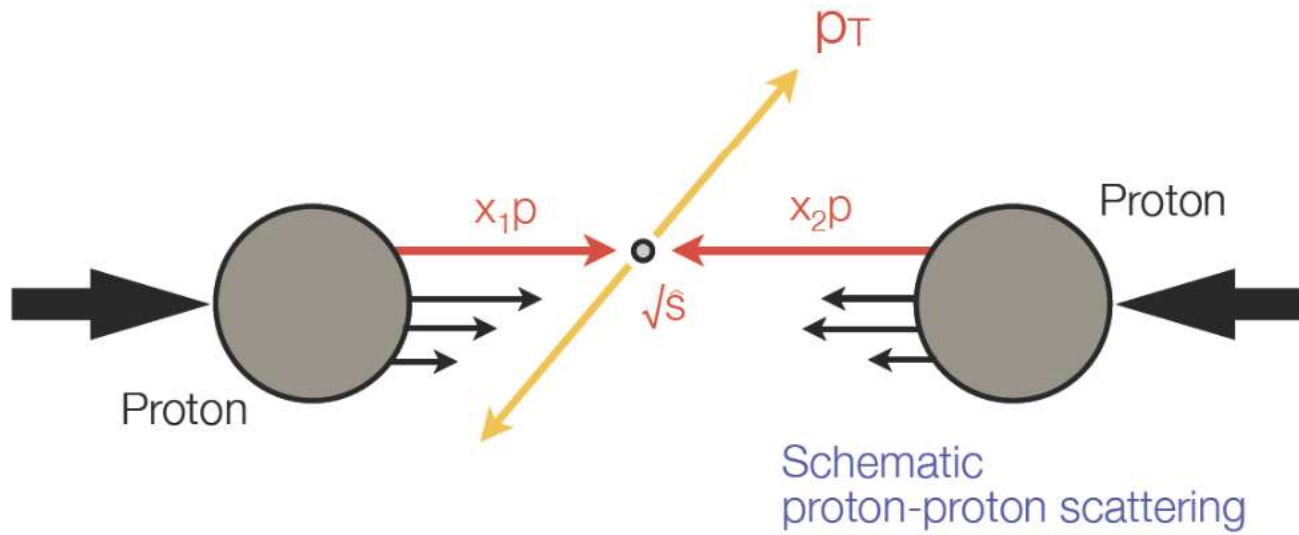




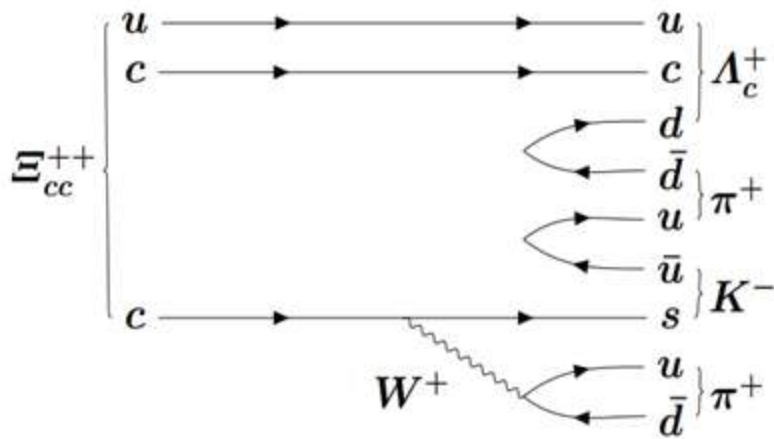




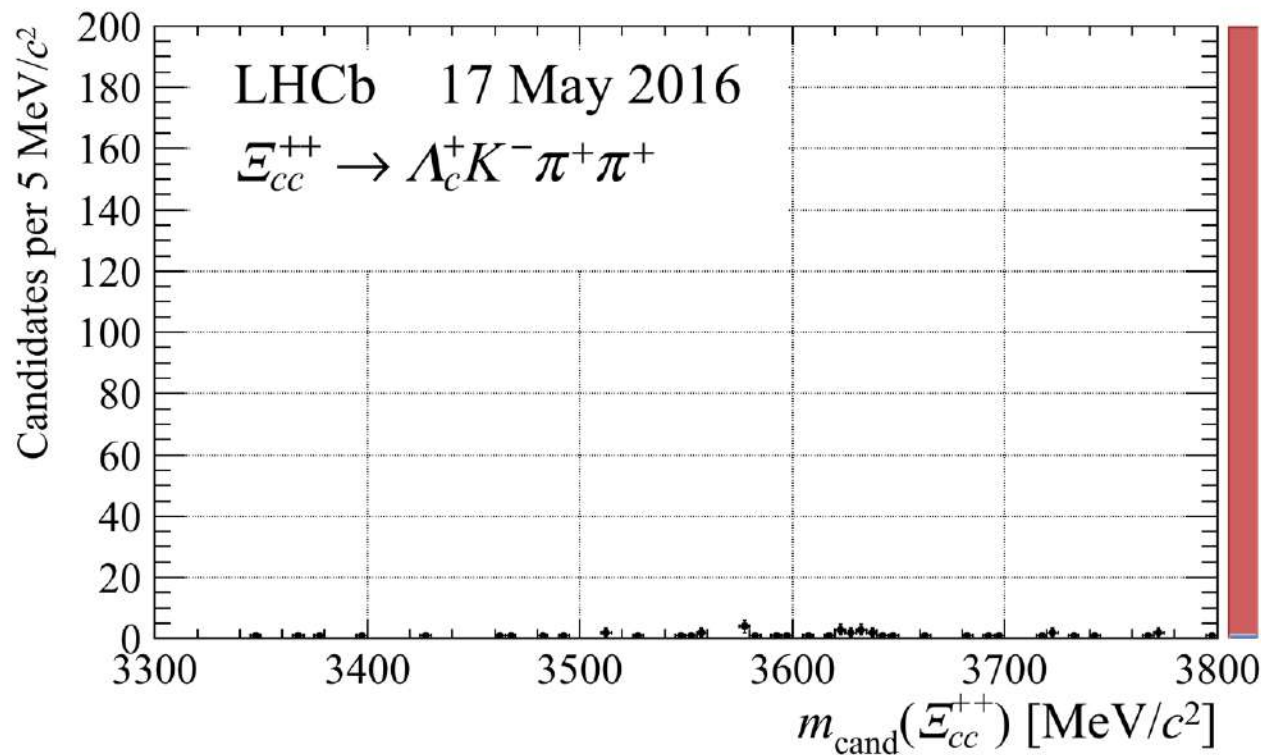
07/05/96HF238mb



Massa invariante (X_{cc}^{++})



$$\begin{aligned}
 M^2 &= (p_1 + p_2)^2 \\
 &= (E_1 + E_2)^2 - (\vec{p}_1 + \vec{p}_2)^2 \\
 &= m_1^2 + m_2^2 + 2E_1 E_2 (1 - \vec{\beta}_1 \vec{\beta}_2)
 \end{aligned}$$



γ (luce, fotoni)

e^-

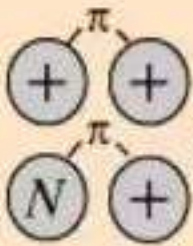
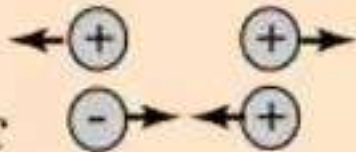
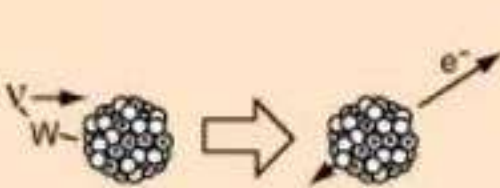
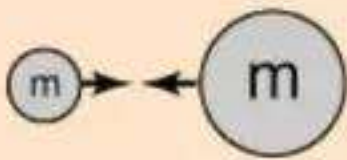
μ^-

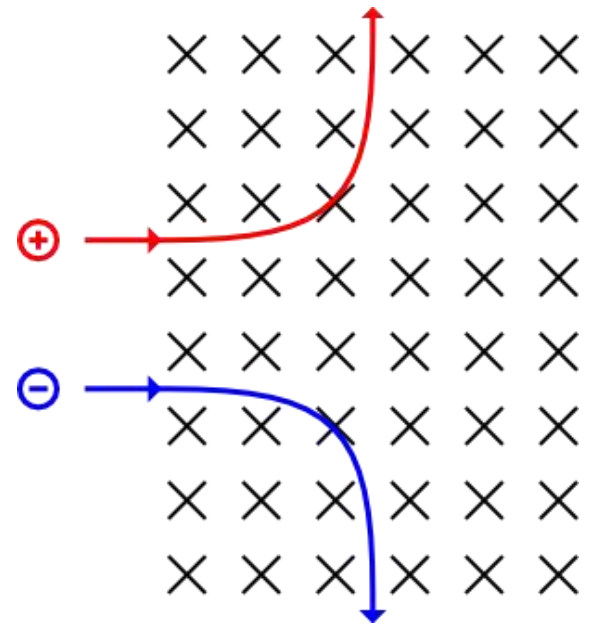
π^- / π^+

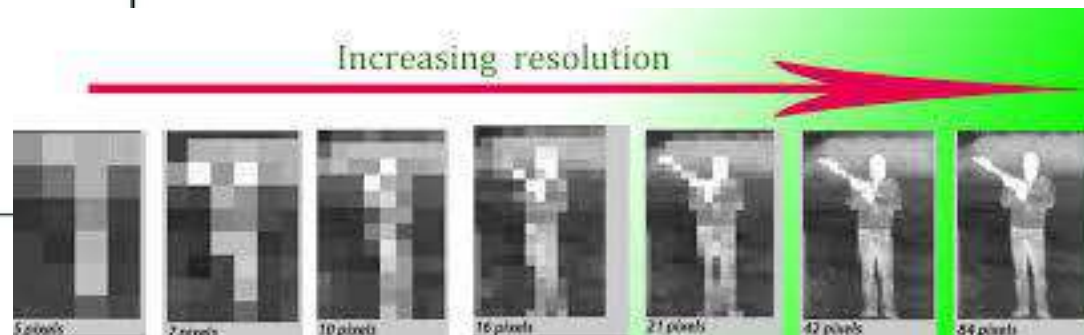
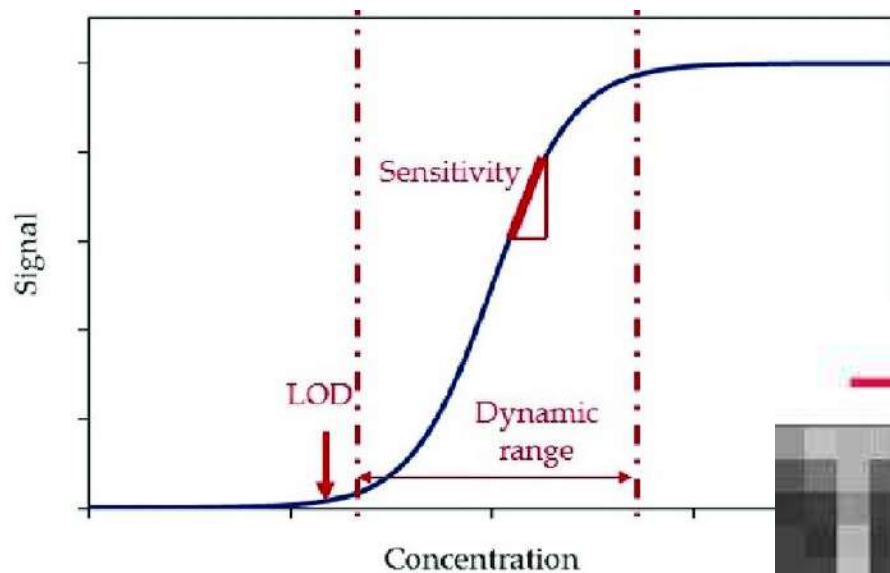
K^- / K^+

p

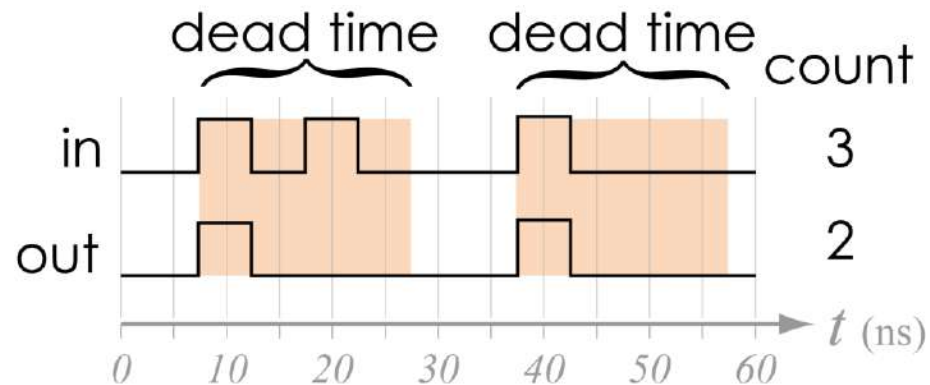
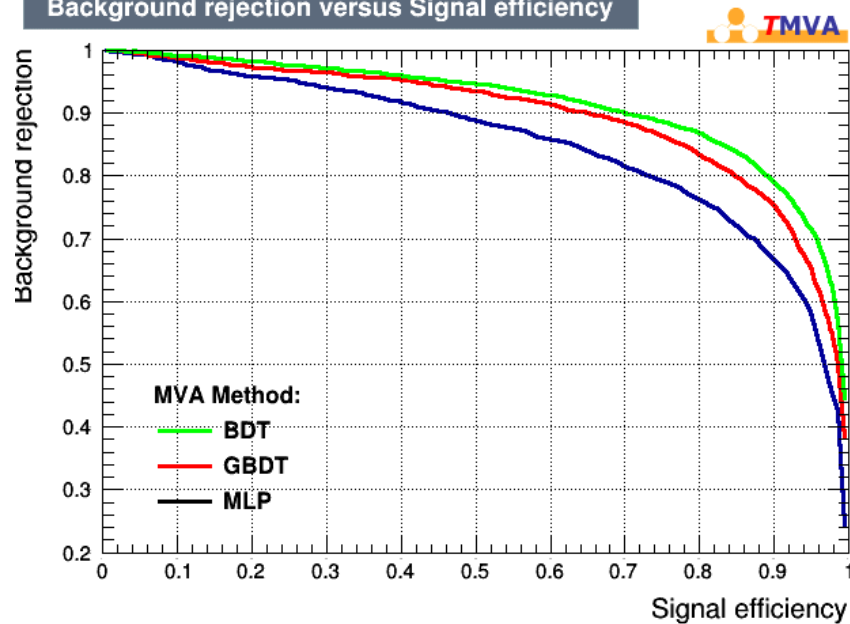
n

<i>Strong</i>	 Force which holds nucleus together	Strength 1	Range (m) 10^{-15} (diameter of a medium sized nucleus)
<i>Electro-magnetic</i>		Strength $\frac{1}{137}$	Range (m) Infinite
<i>Weak</i>	 neutrino interaction induces beta decay	Strength 10^{-6}	Range (m) 10^{-18} (0.1% of the diameter of a proton)
<i>Gravity</i>		Strength 6×10^{-39}	Range (m) Infinite

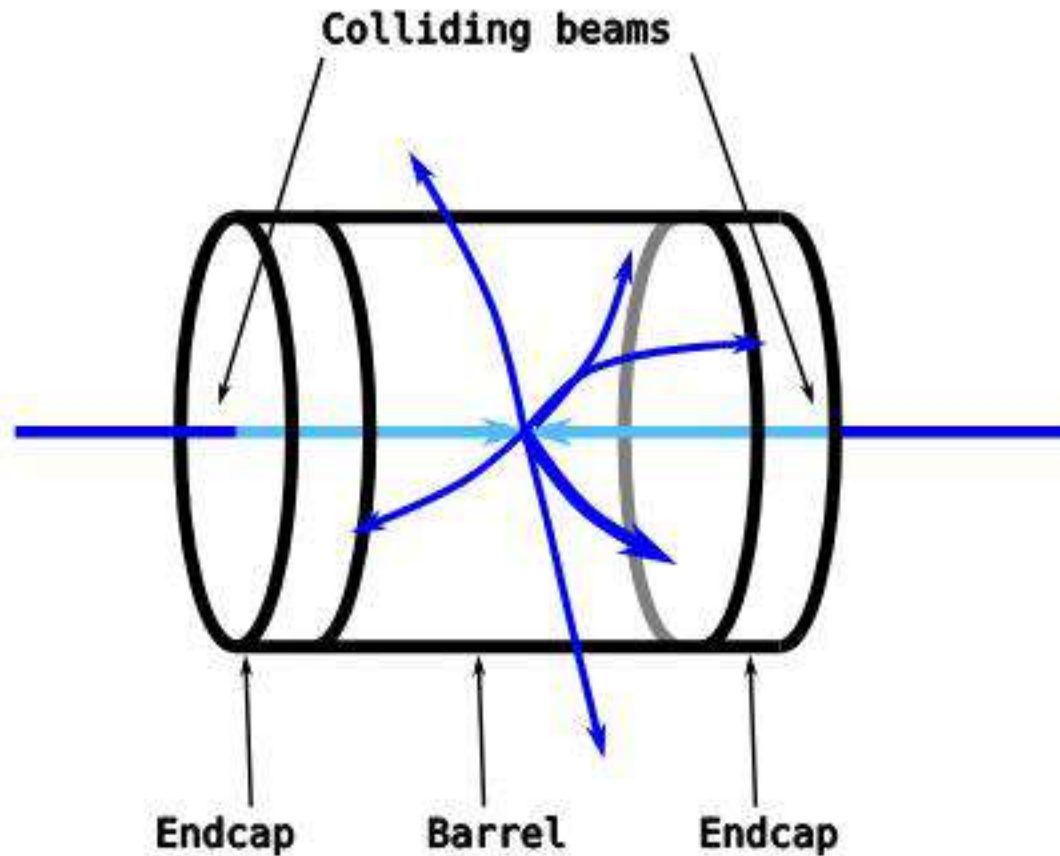




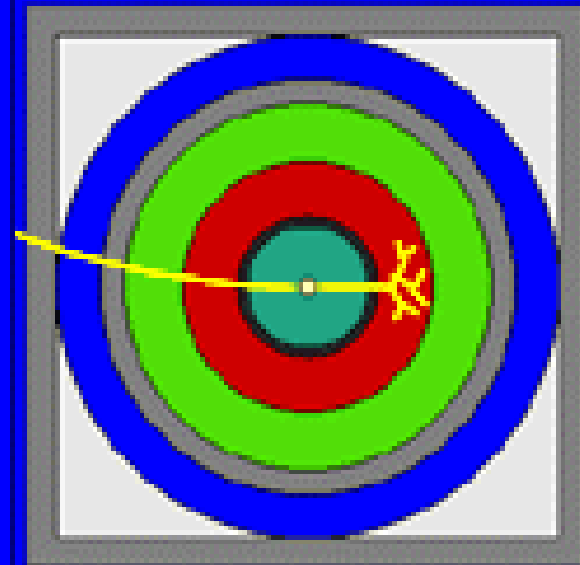
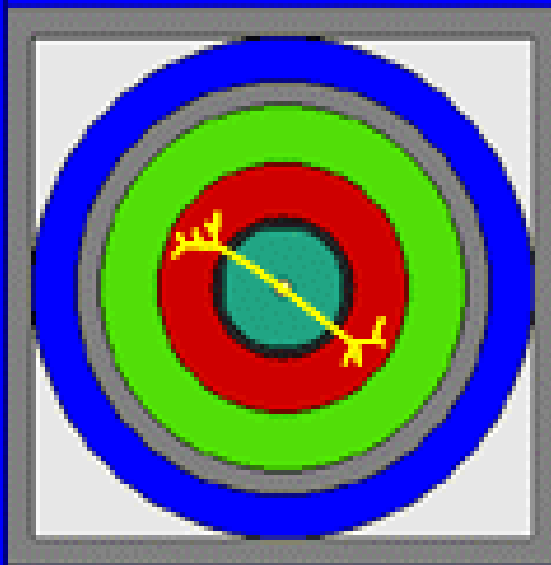
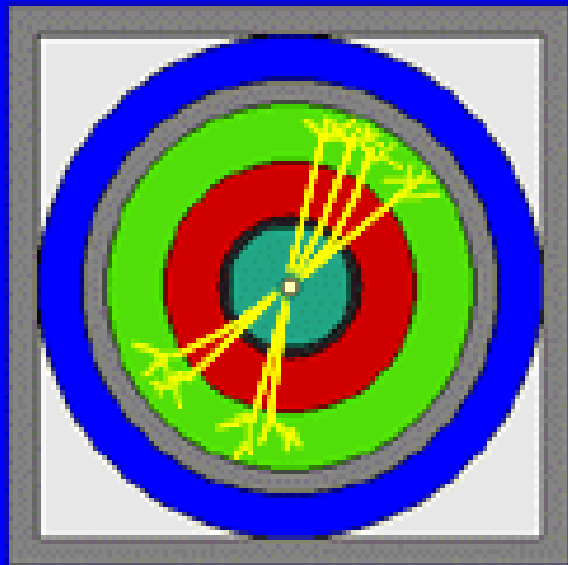
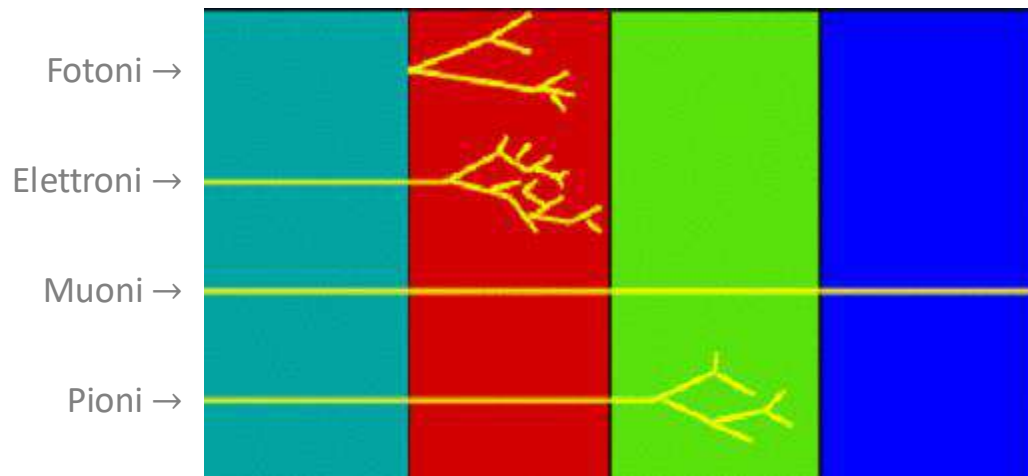
Background rejection versus Signal efficiency

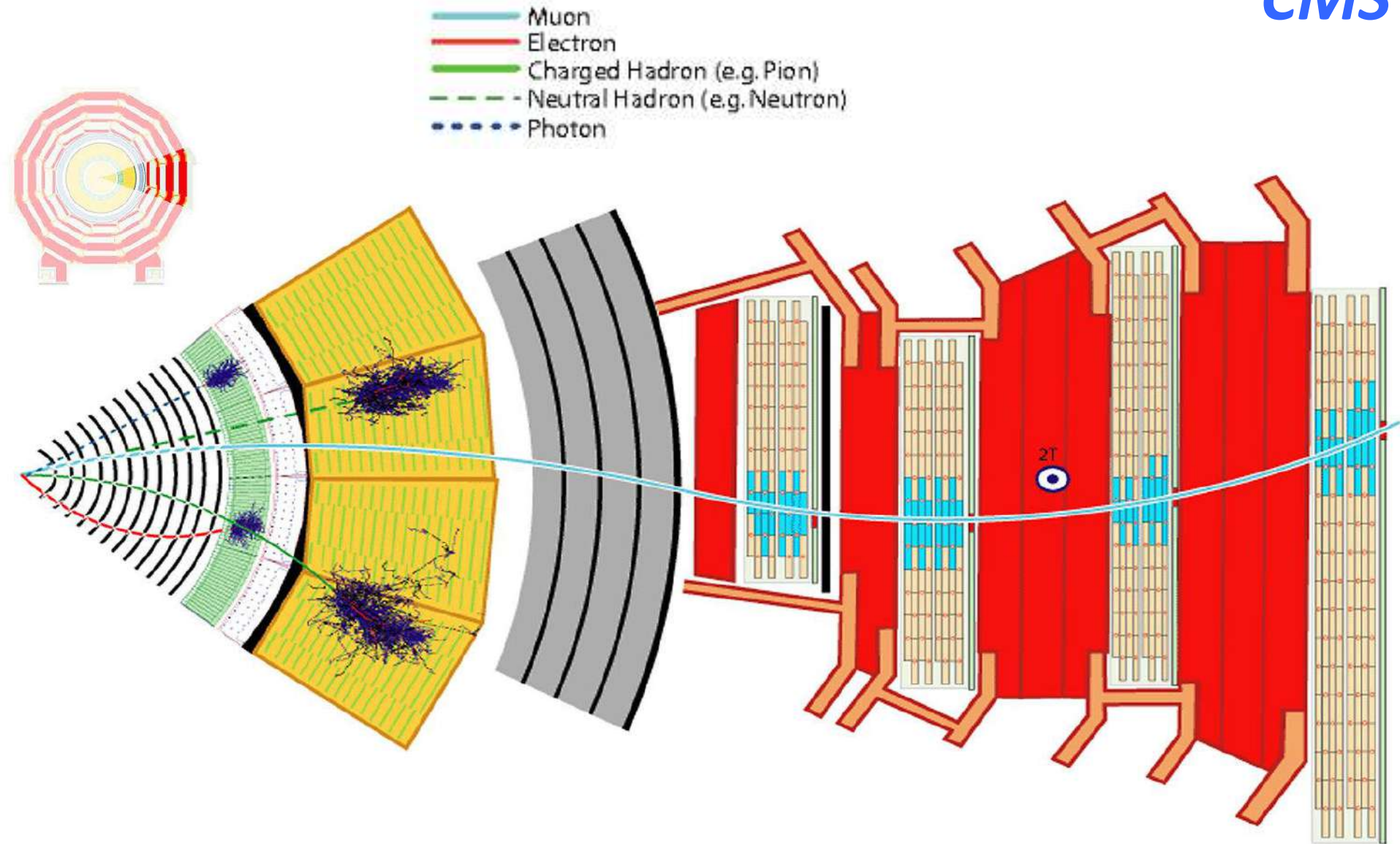


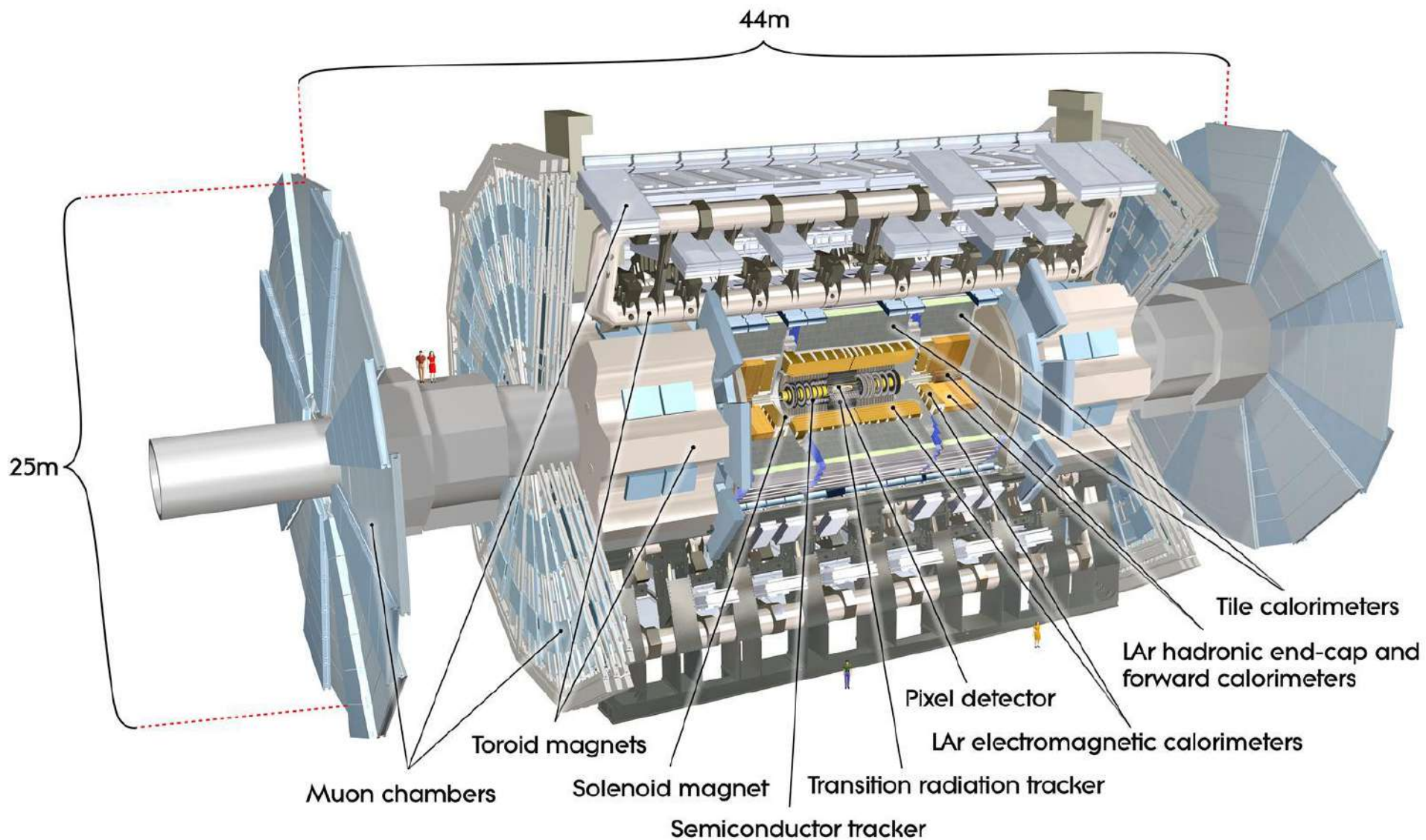
Collisore - geometria ermetica (4π)

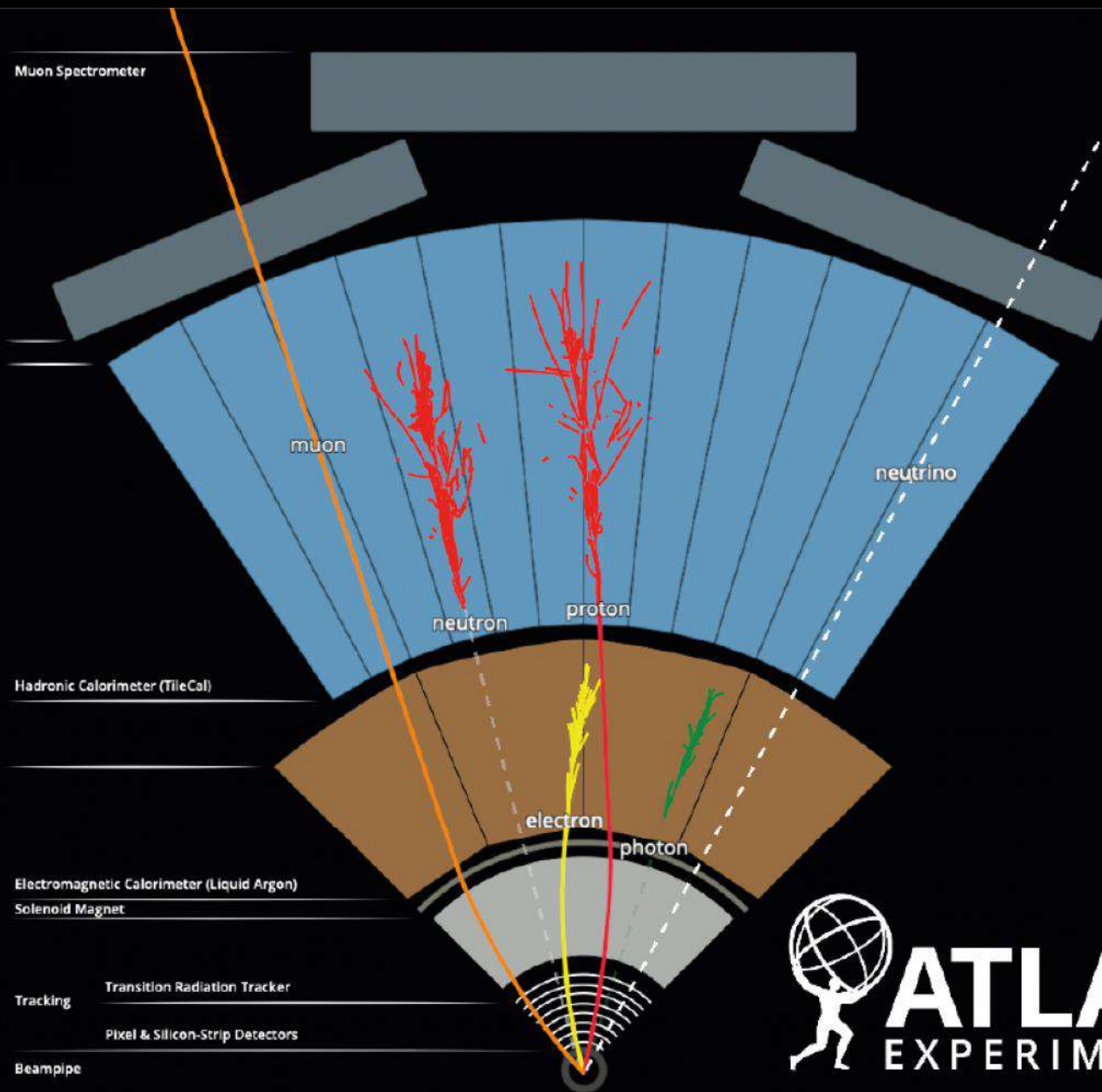


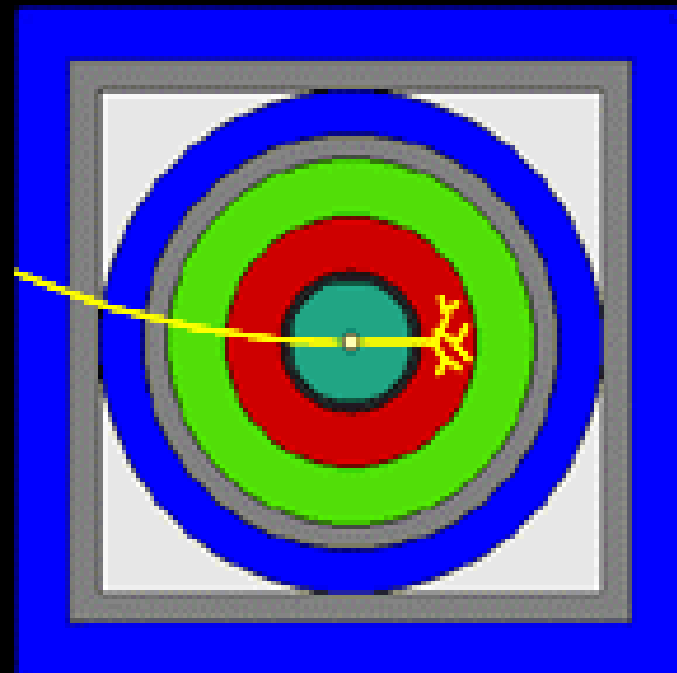
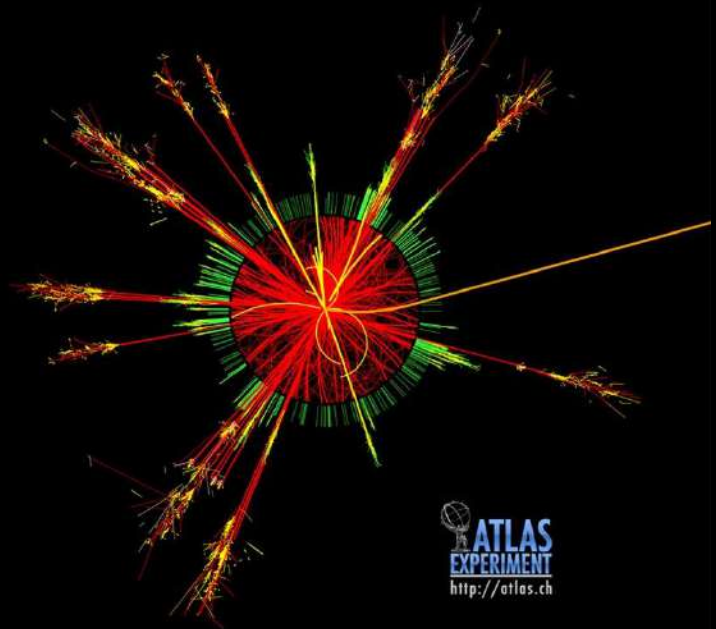
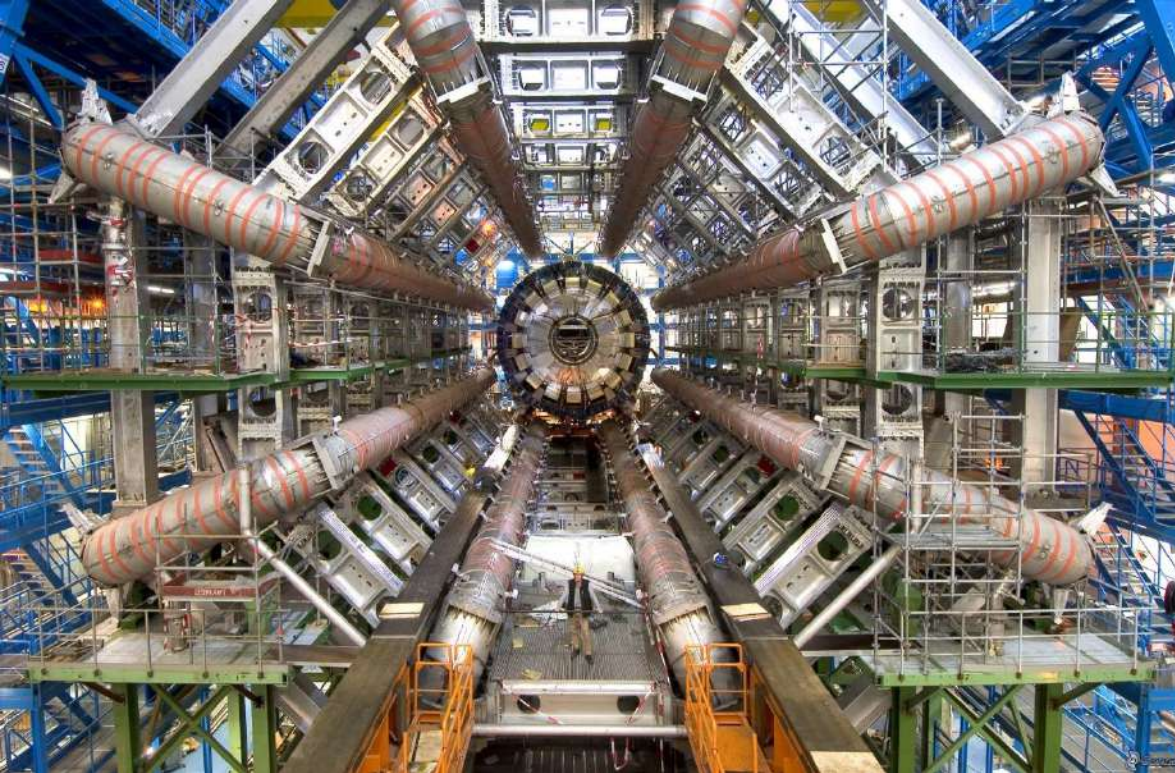
Indovina chi?



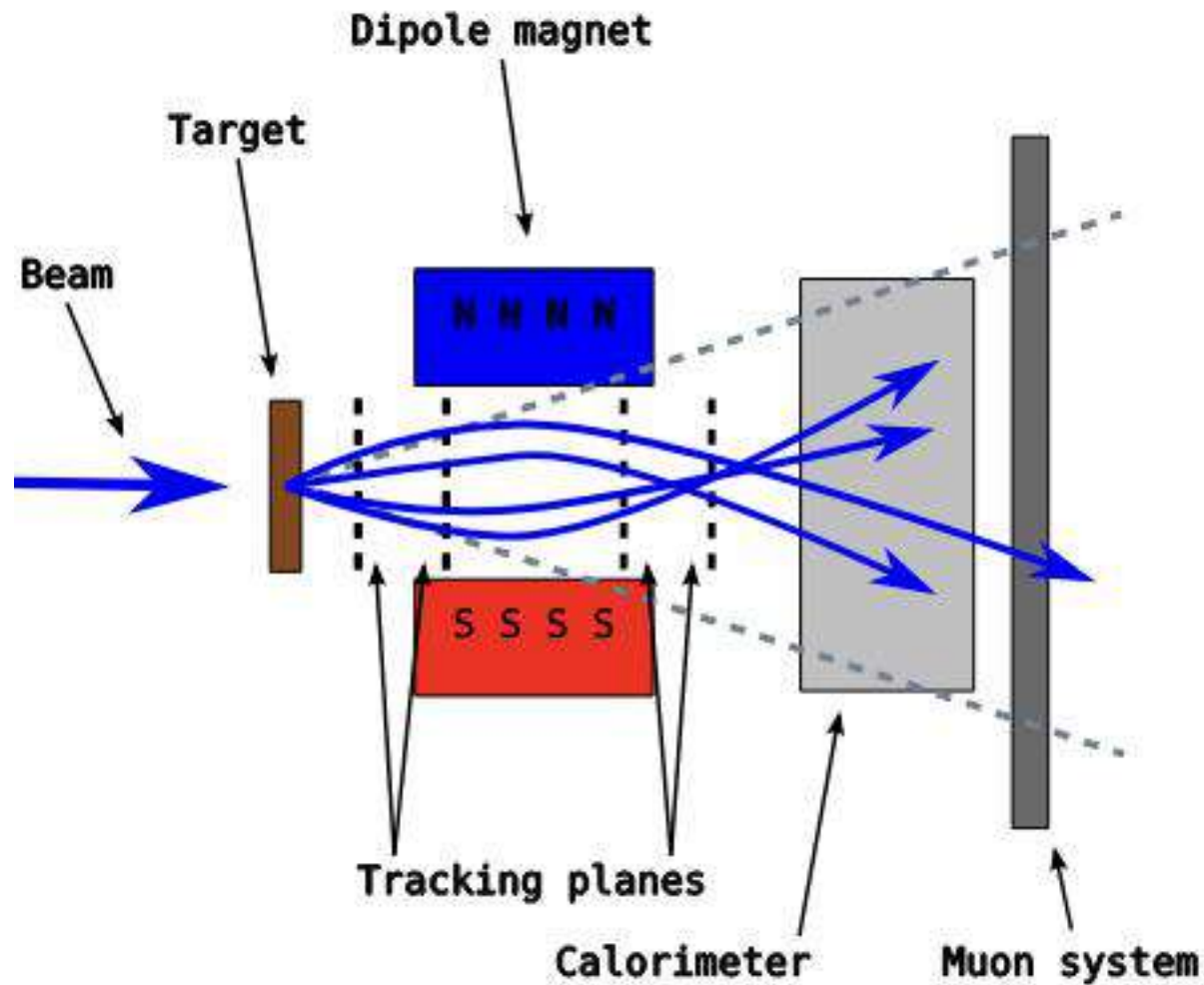


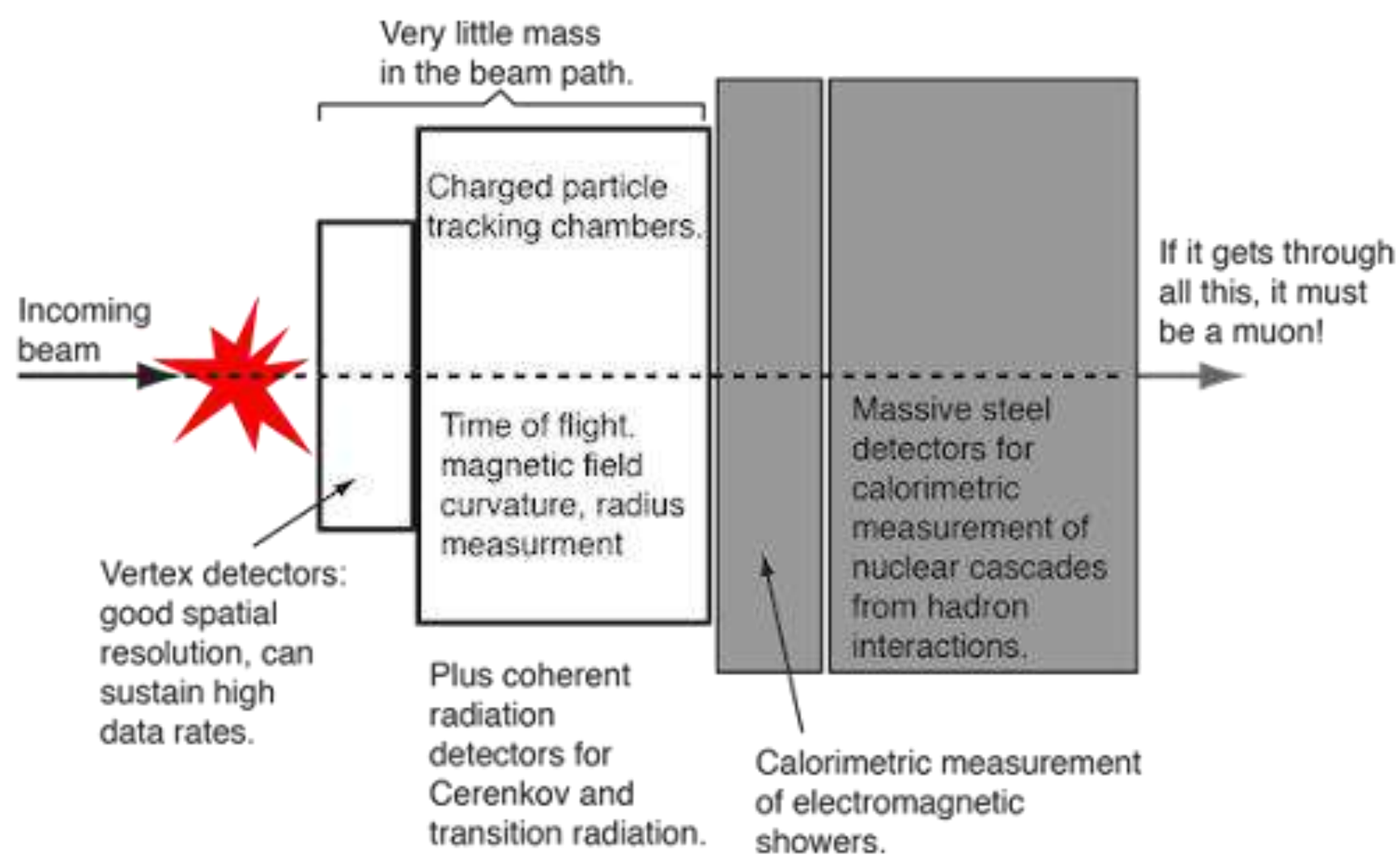


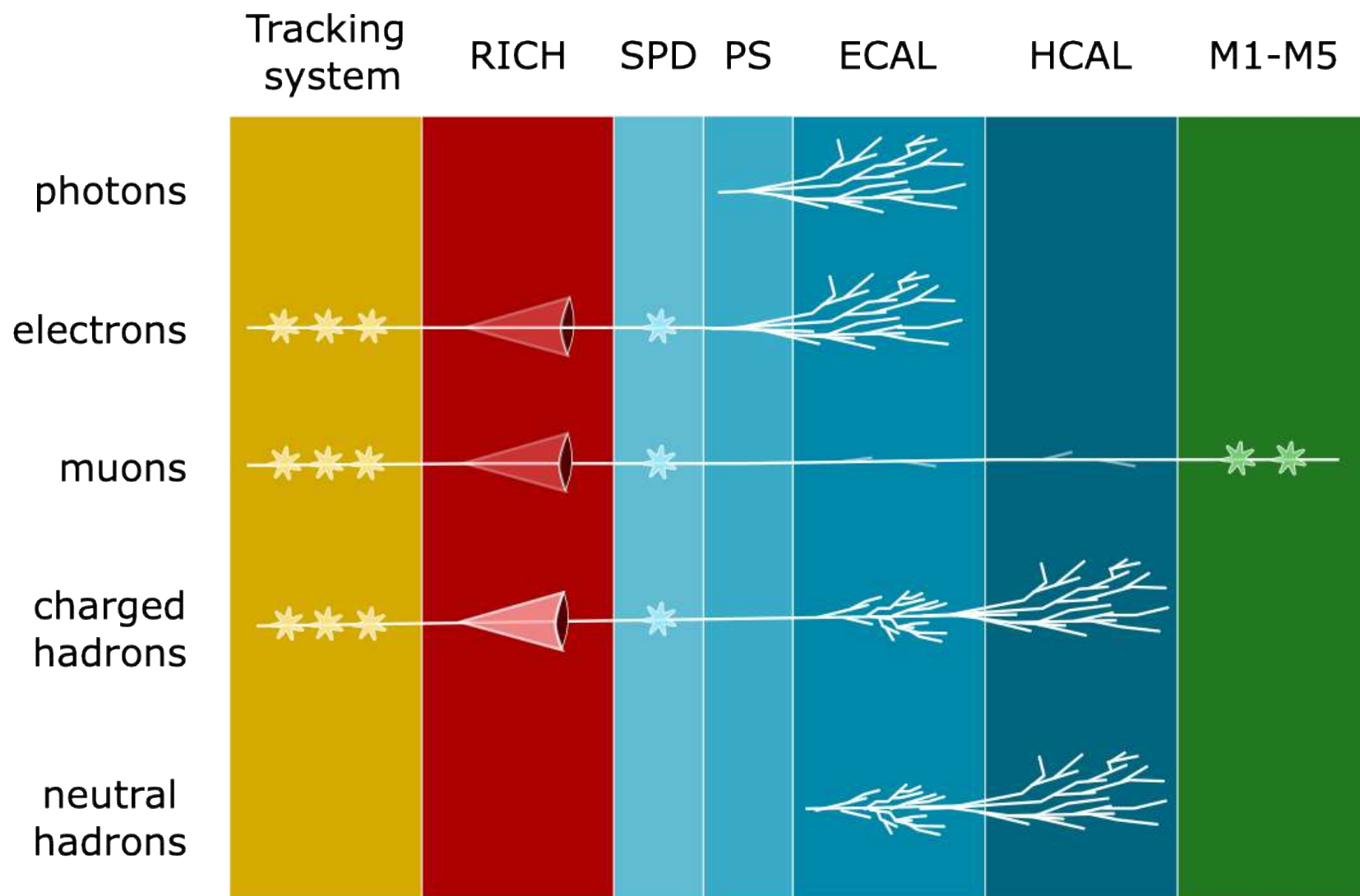


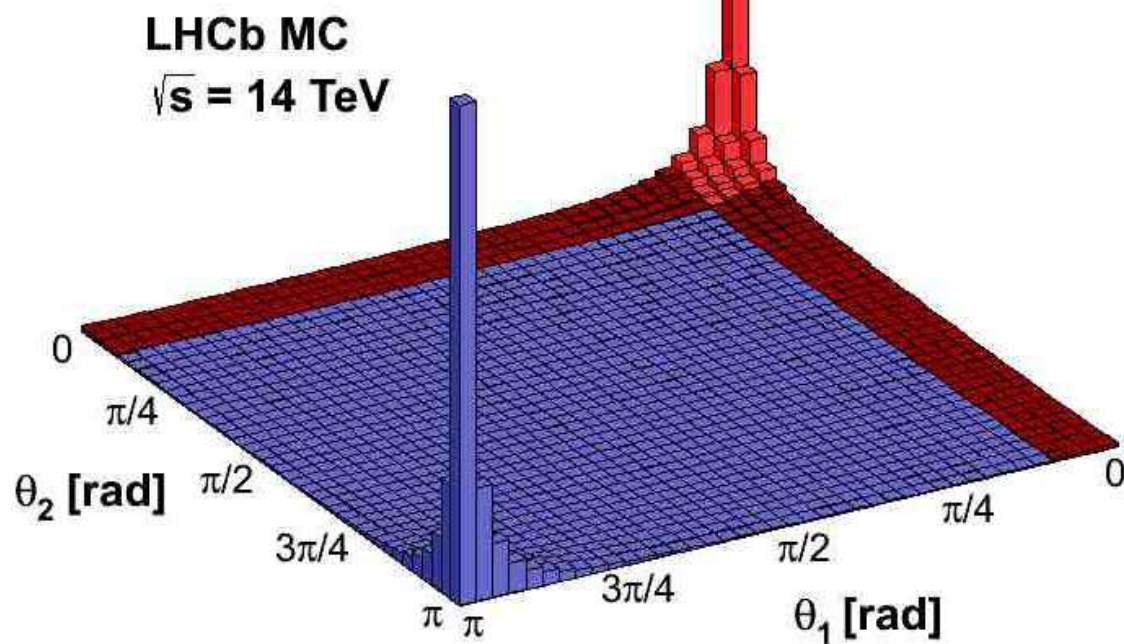
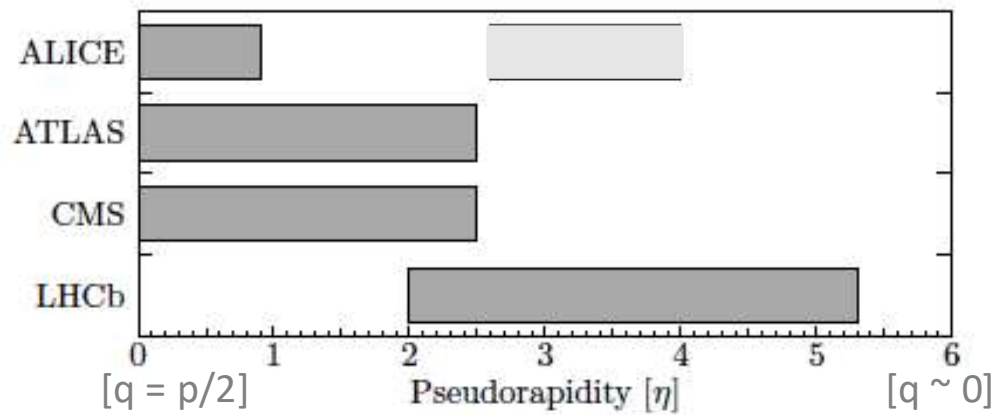
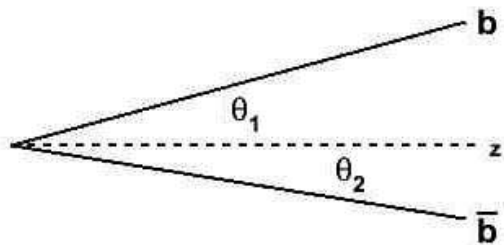


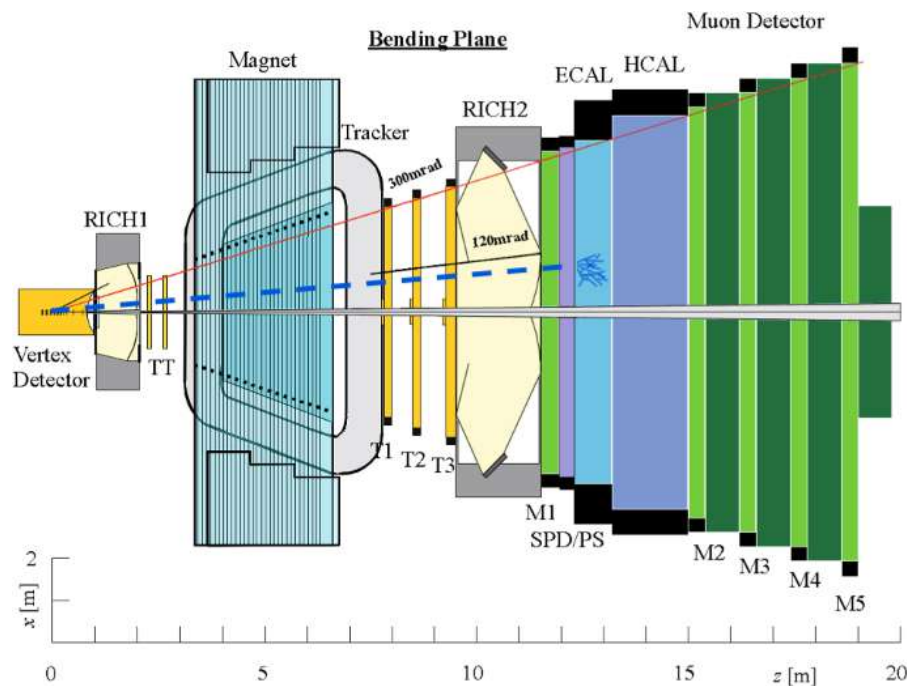
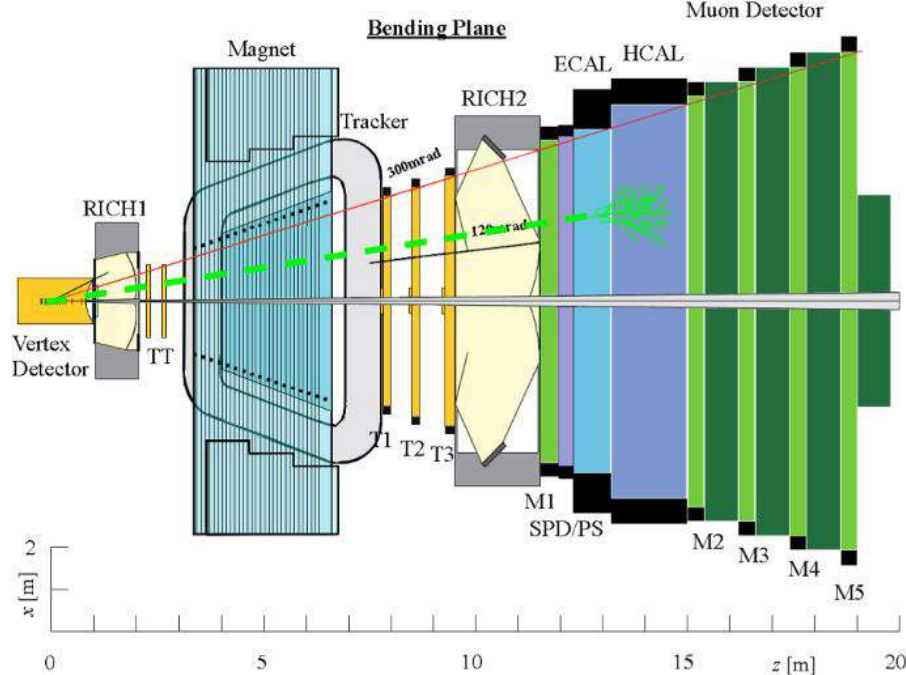
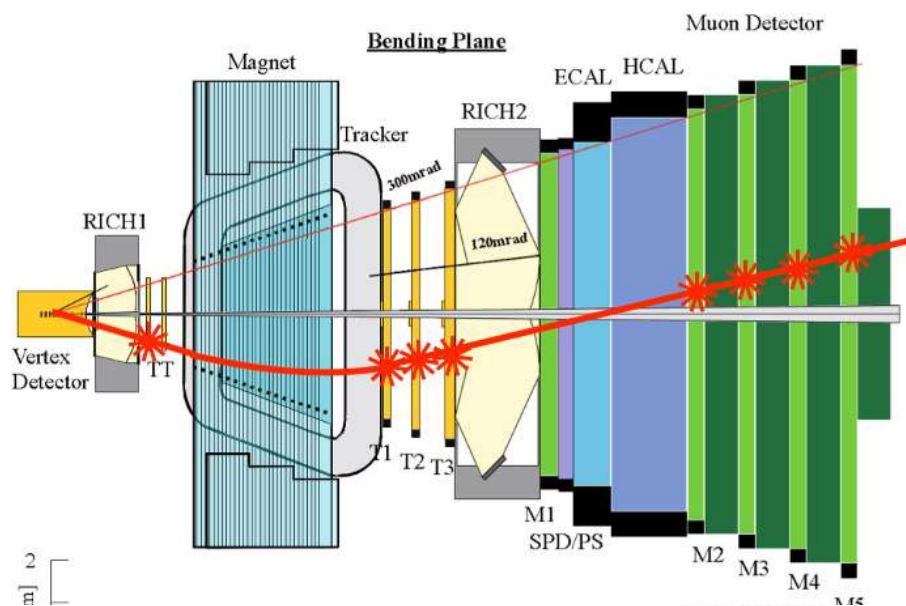
A bersaglio fisso - spettrometro

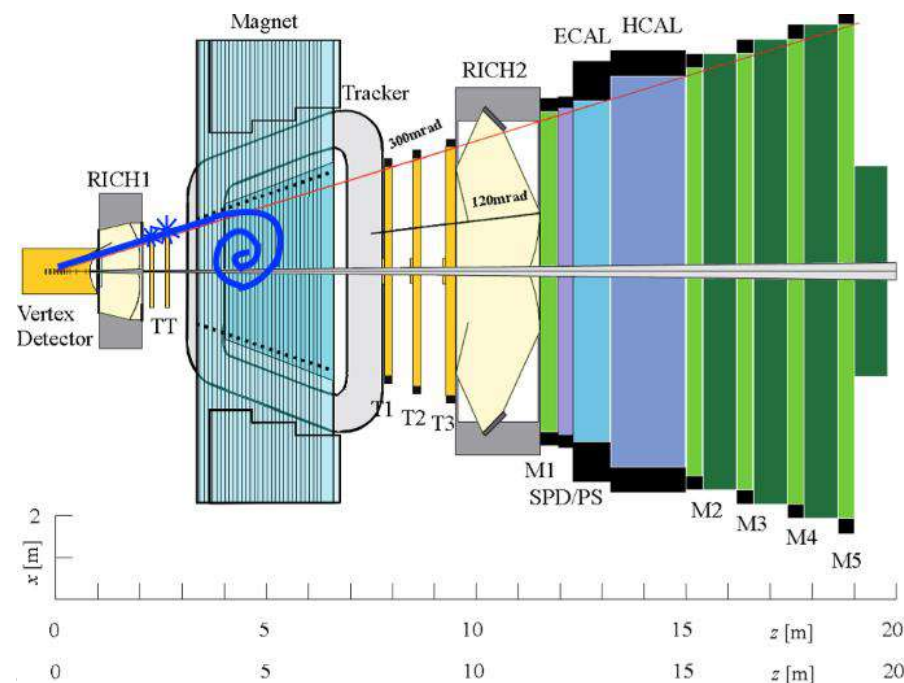
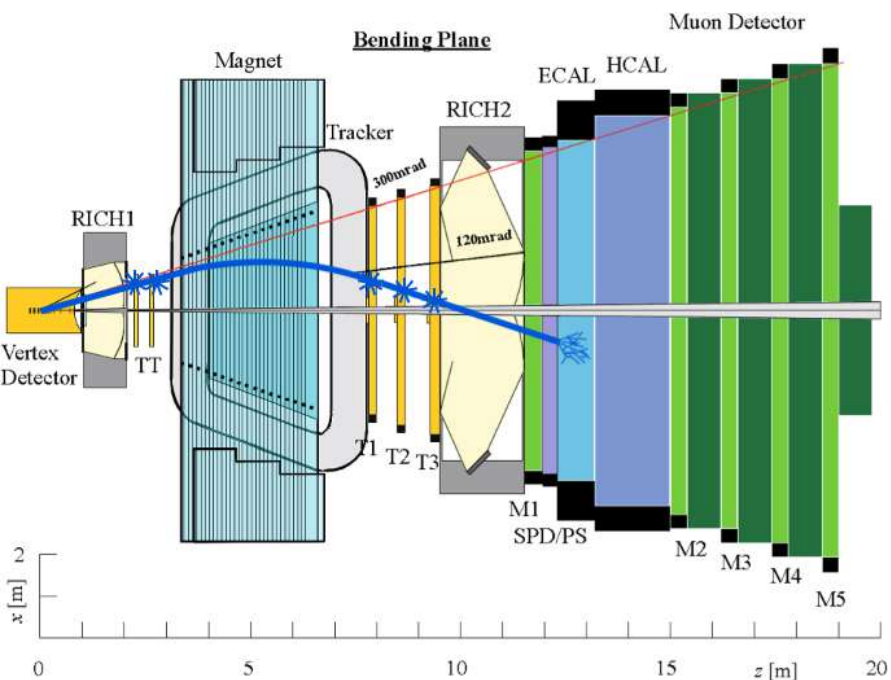
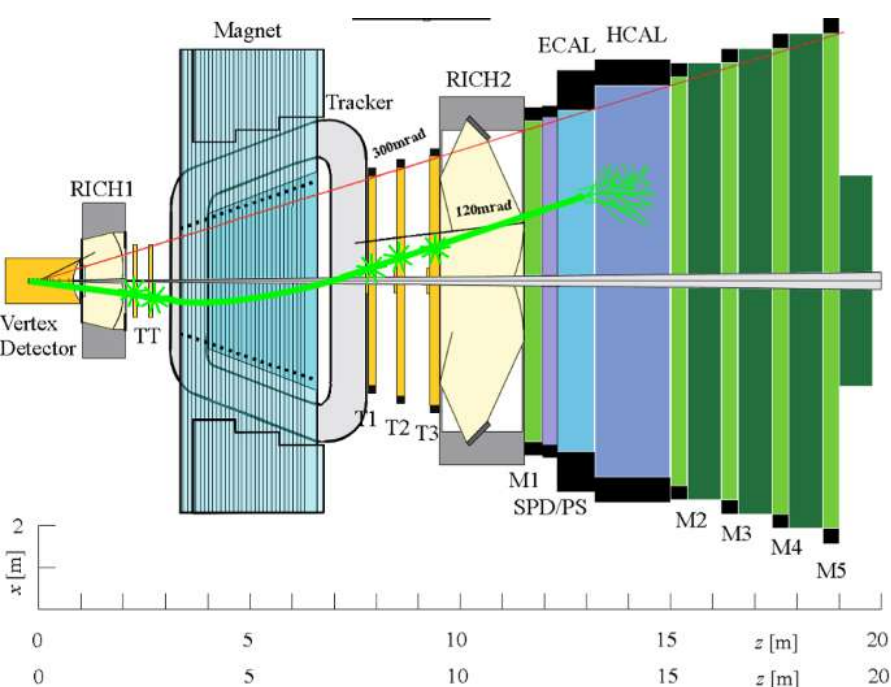






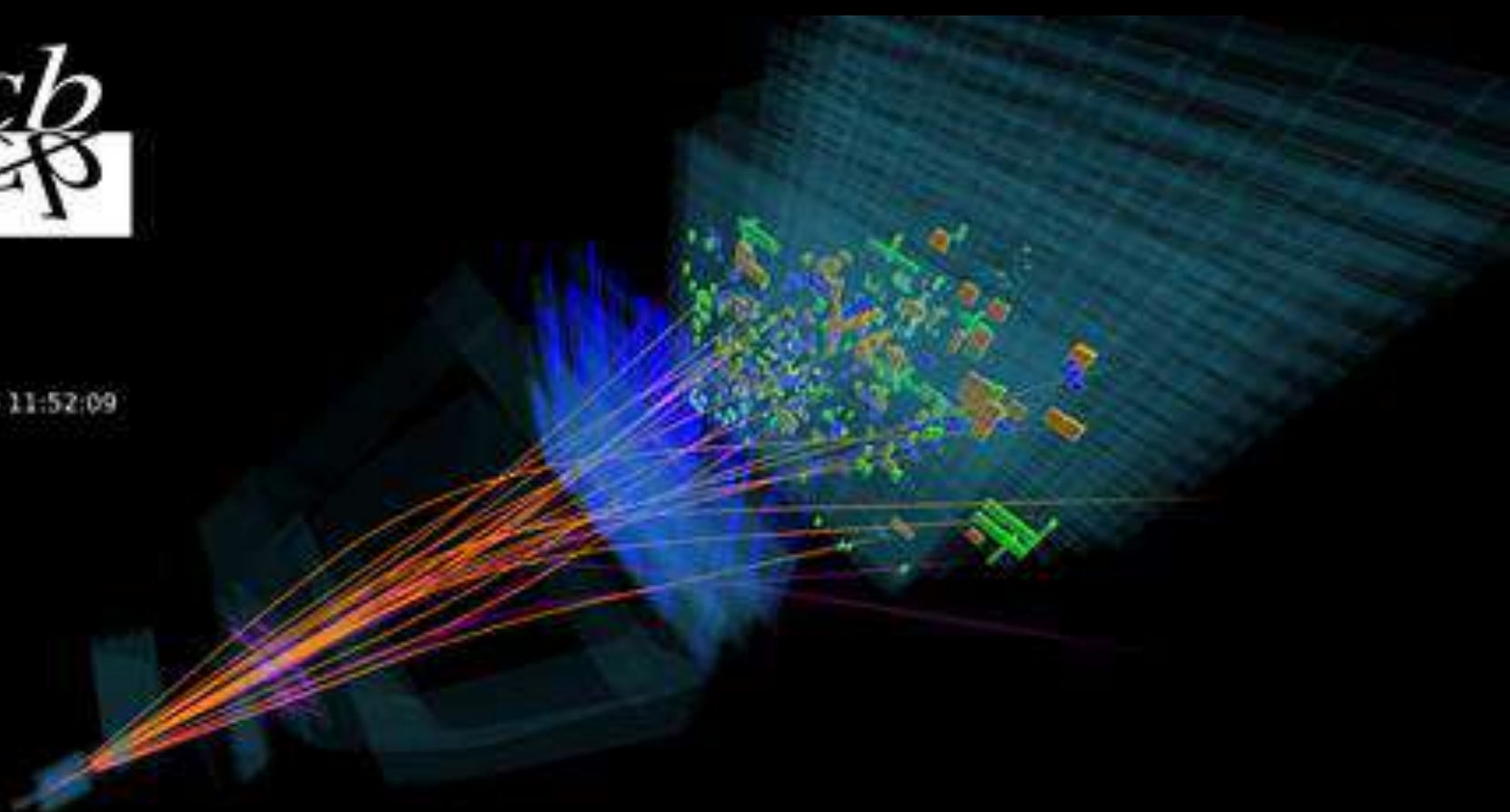




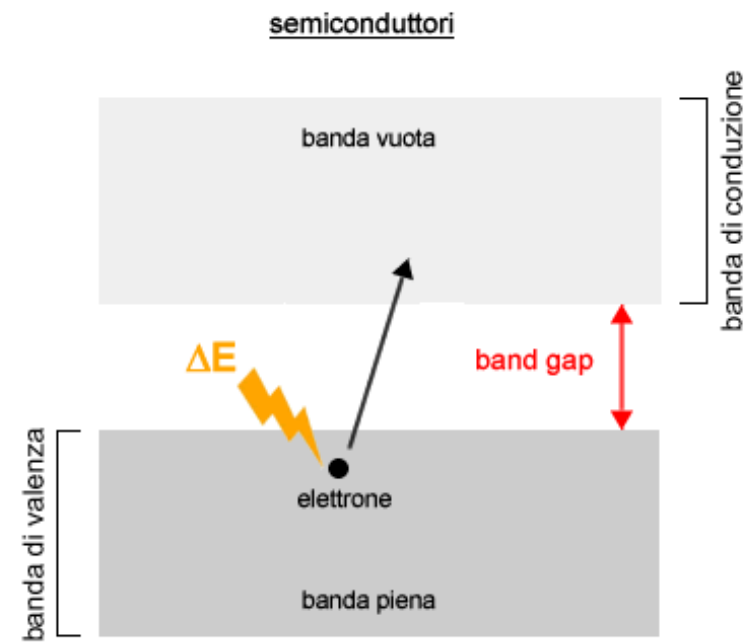
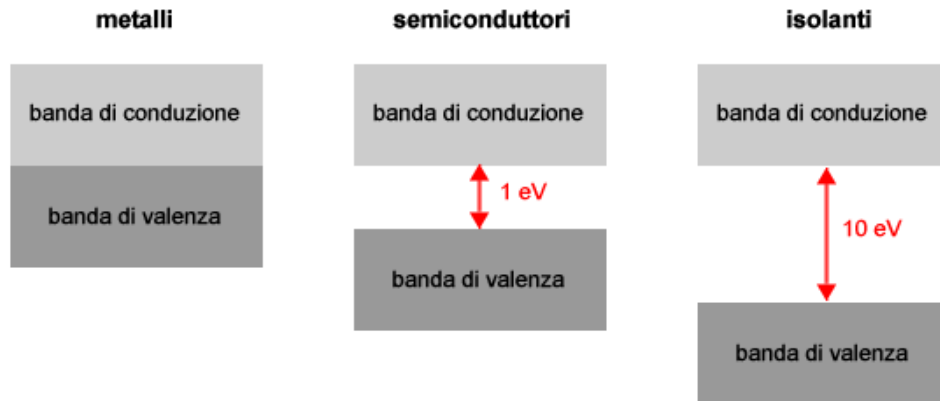




Event 41383468
Run 153460
Wed. 03 Jun 2015 11:52:09



Semiconduttori

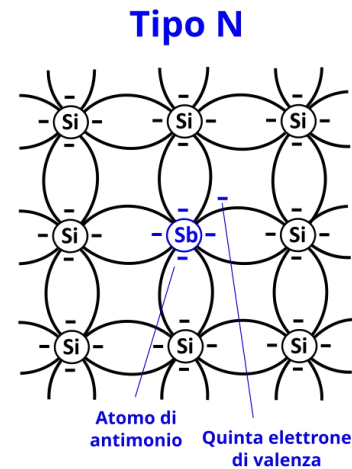
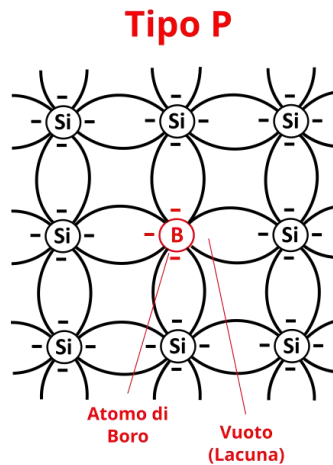
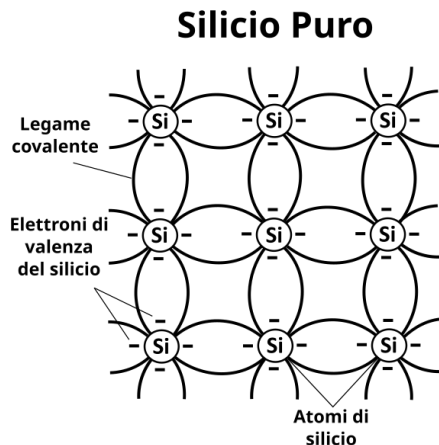


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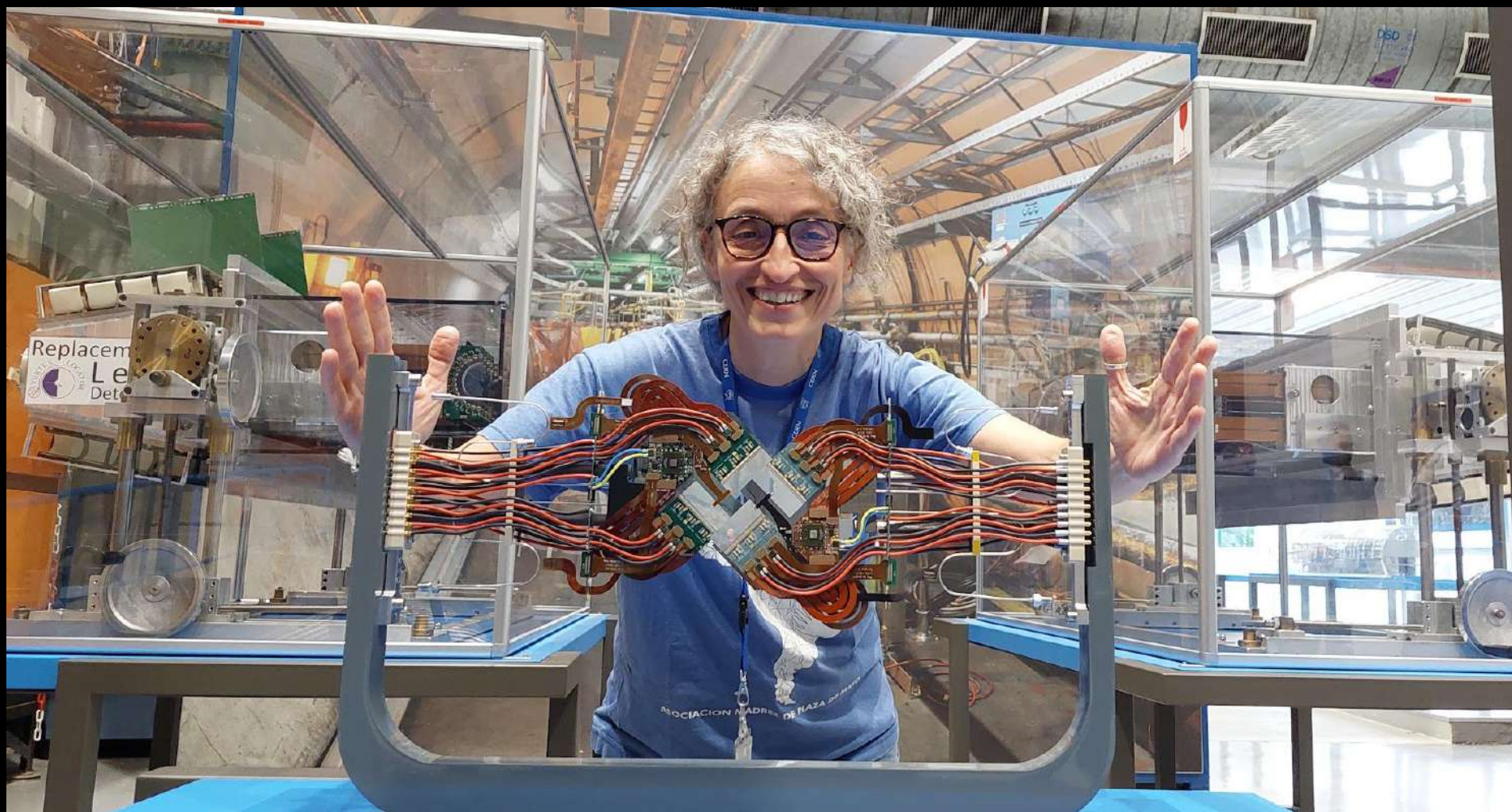
Intrinseco (Non drogato)

Estrinseco (Drogato)



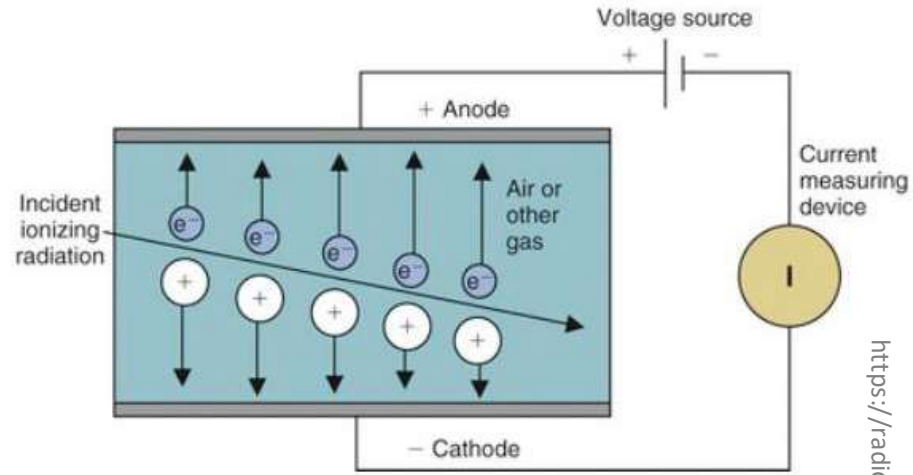
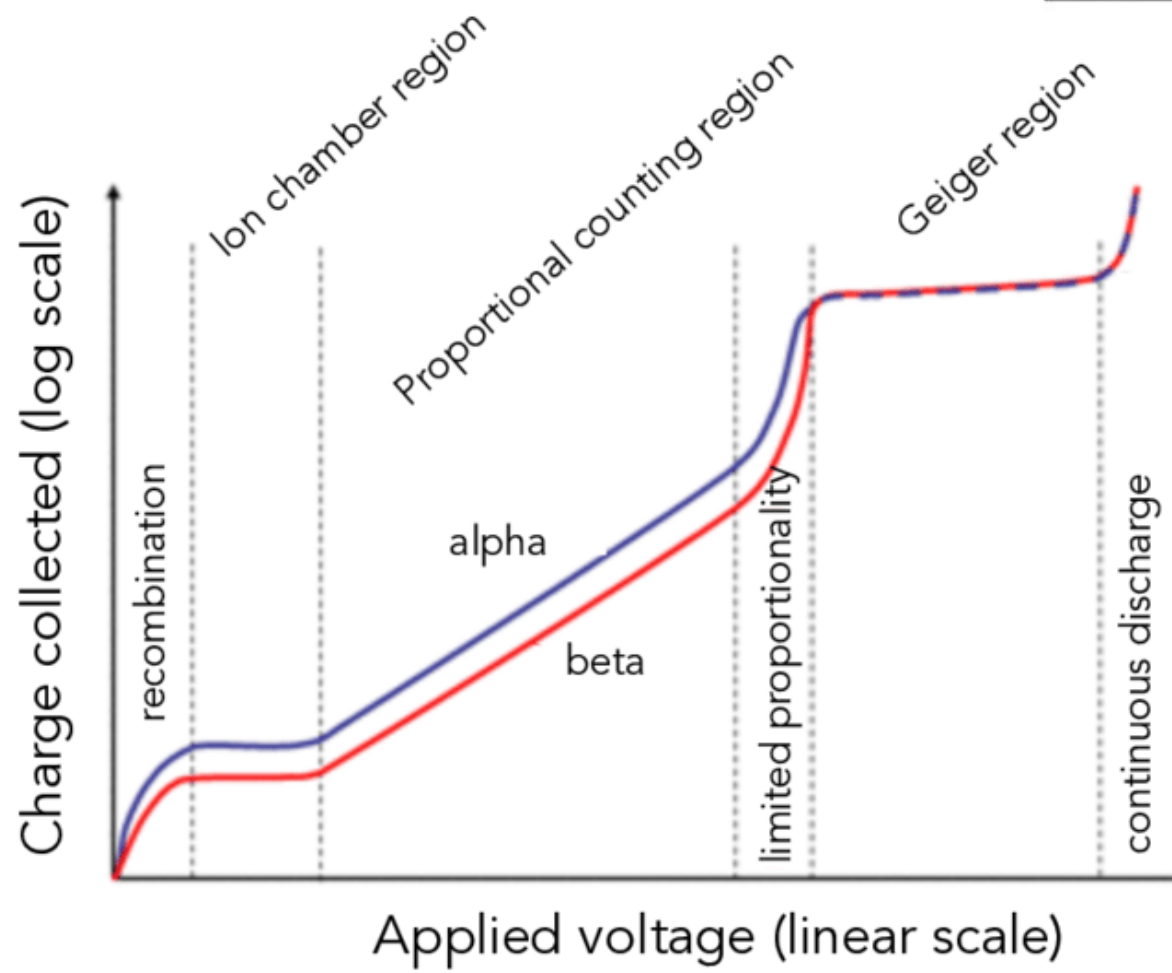
Rivelatori a stato solido

Courtesy: LHCb/Paula Collins

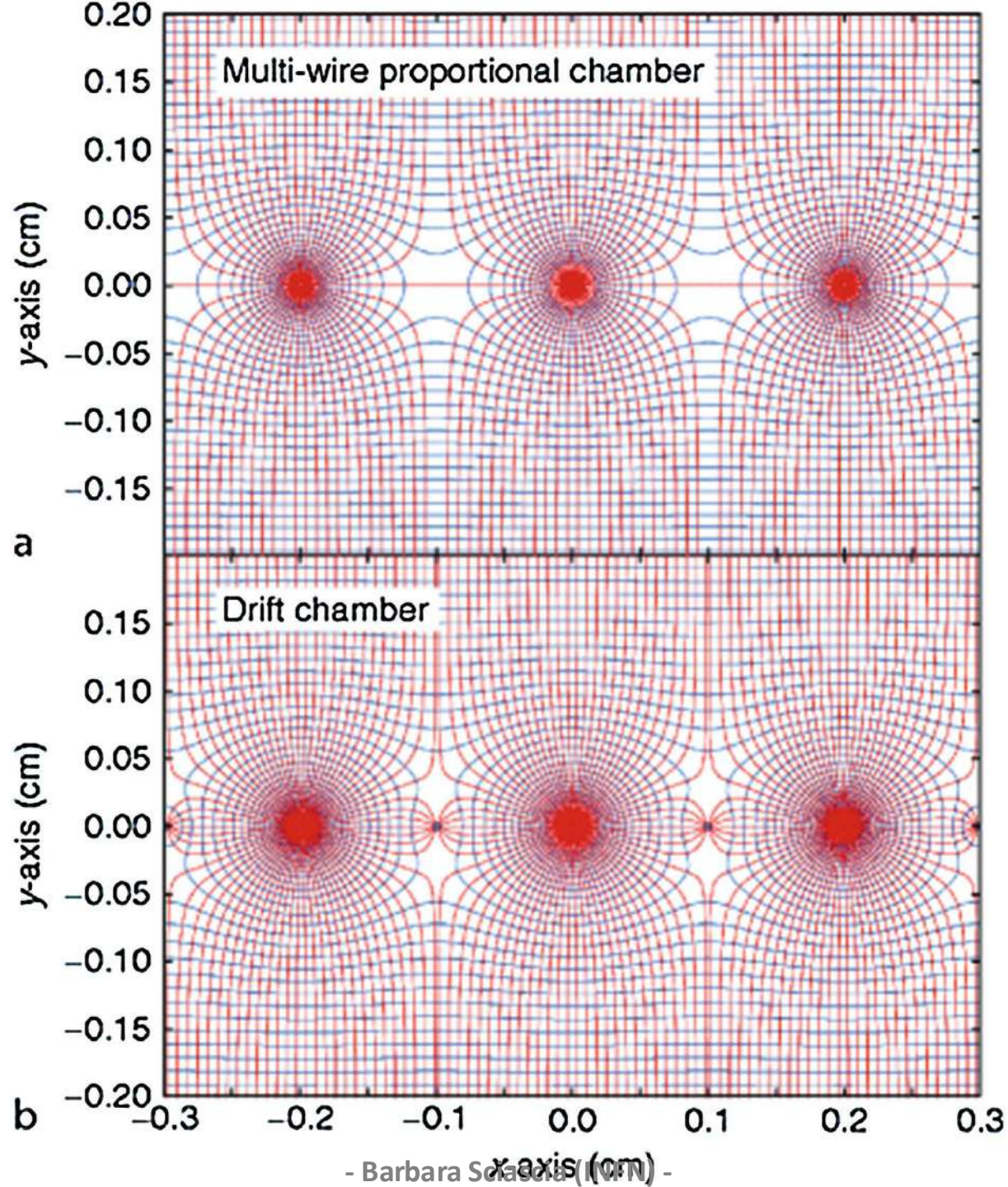


Ionizzazione

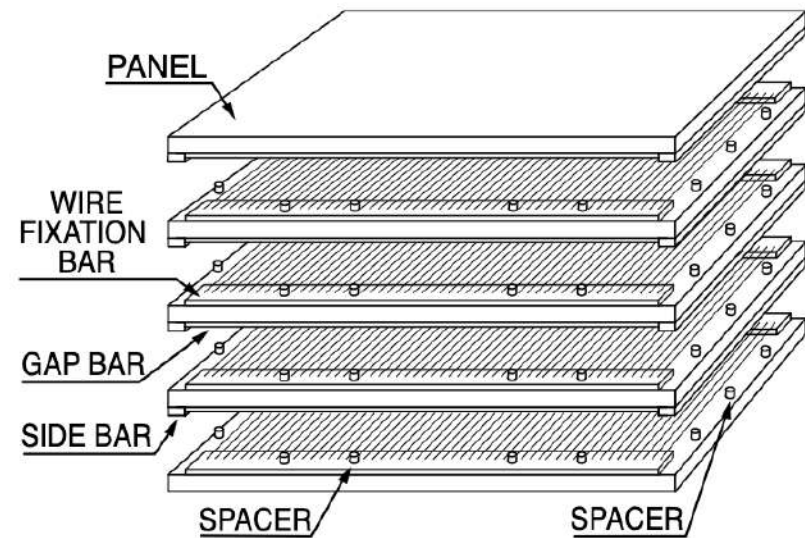
<https://www.researchgate.net/profile/Giacomo-Mauri>



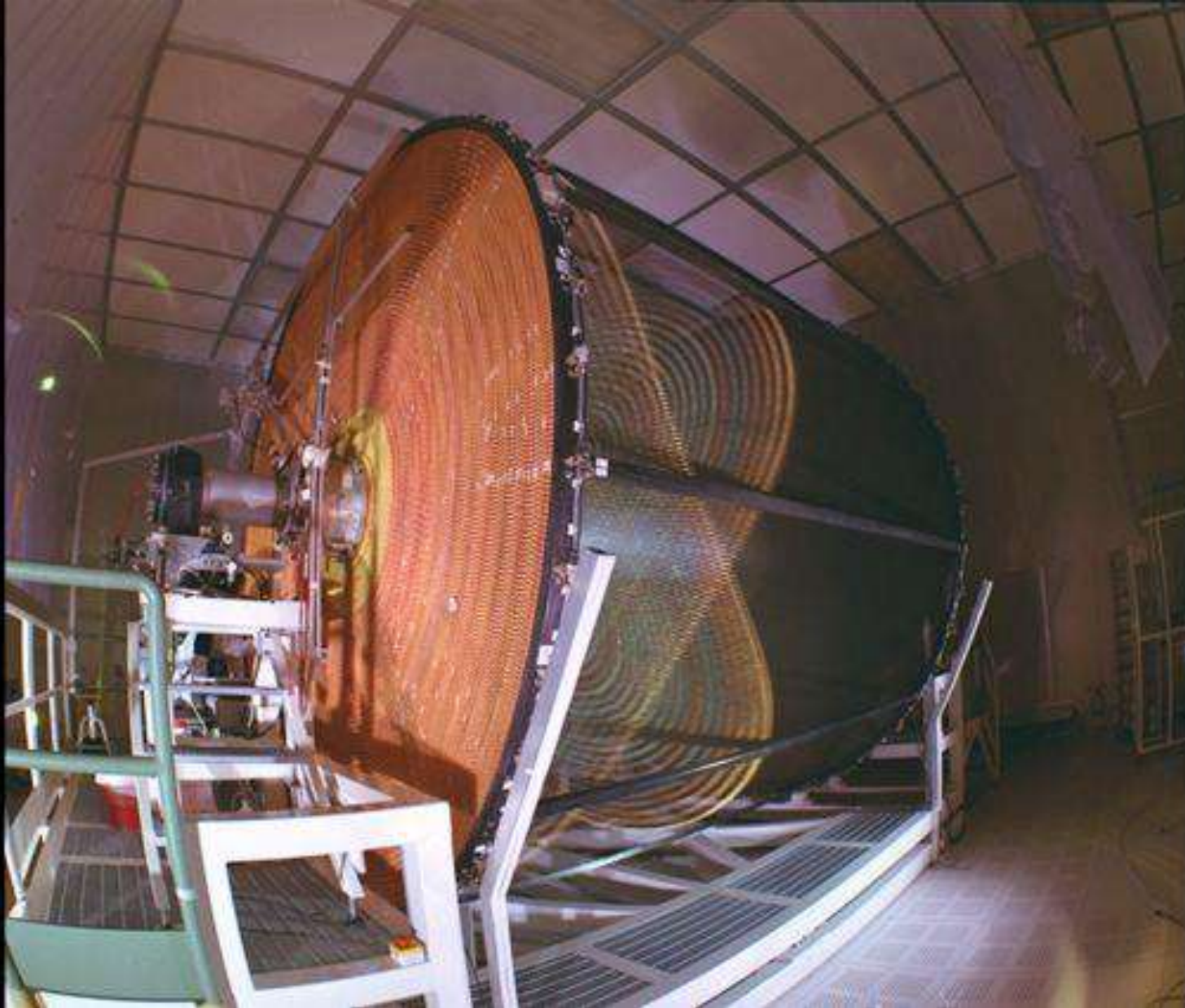
<https://radiologykey.com/radiation-detectors/>



Multi Wire Proportional Chamber (MWPC)

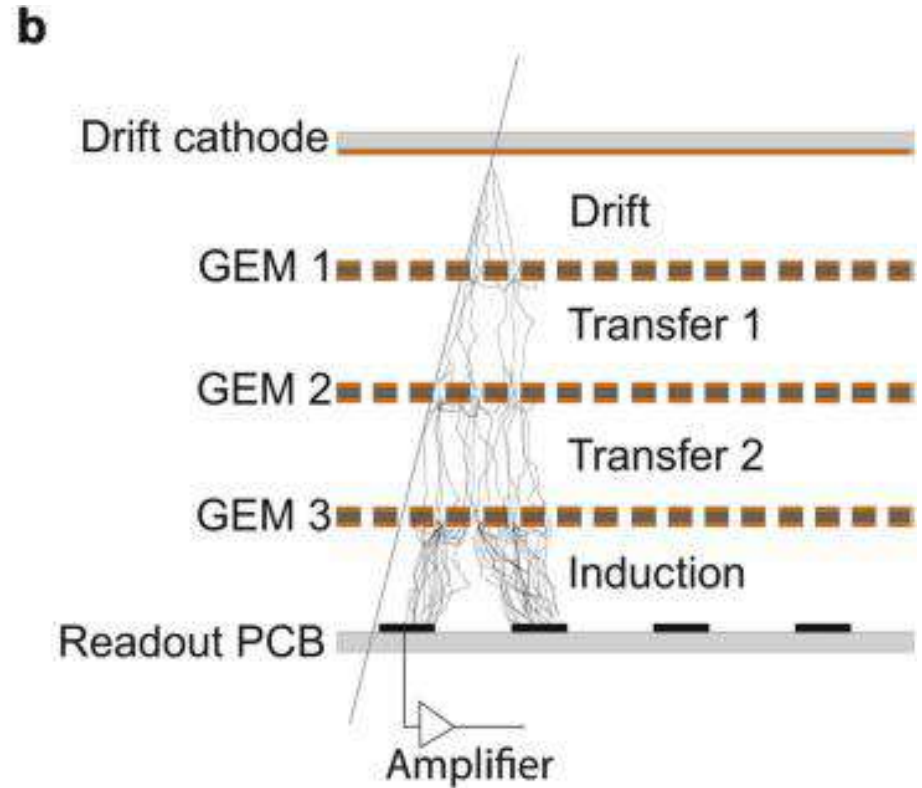
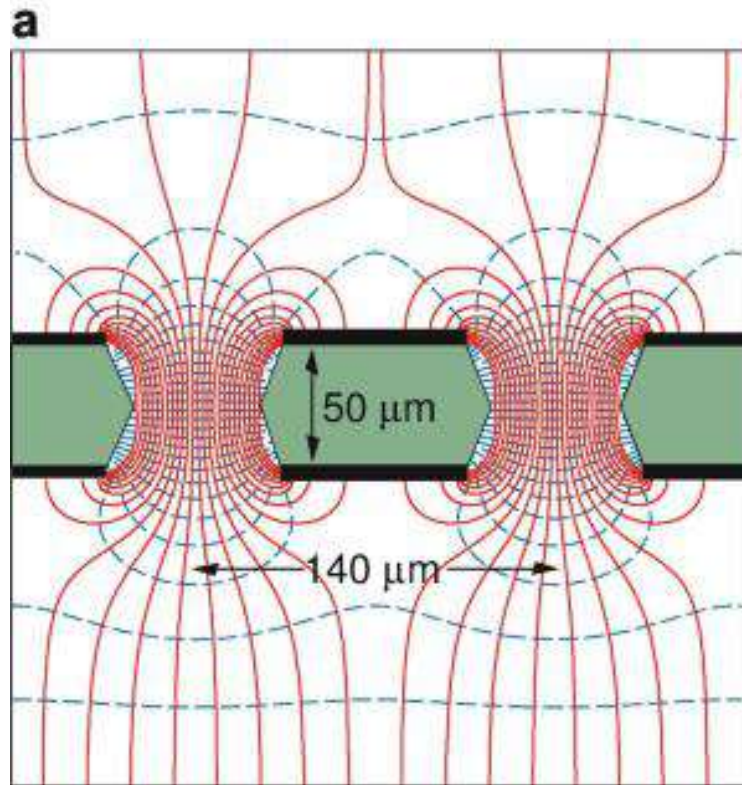


Camera a deriva

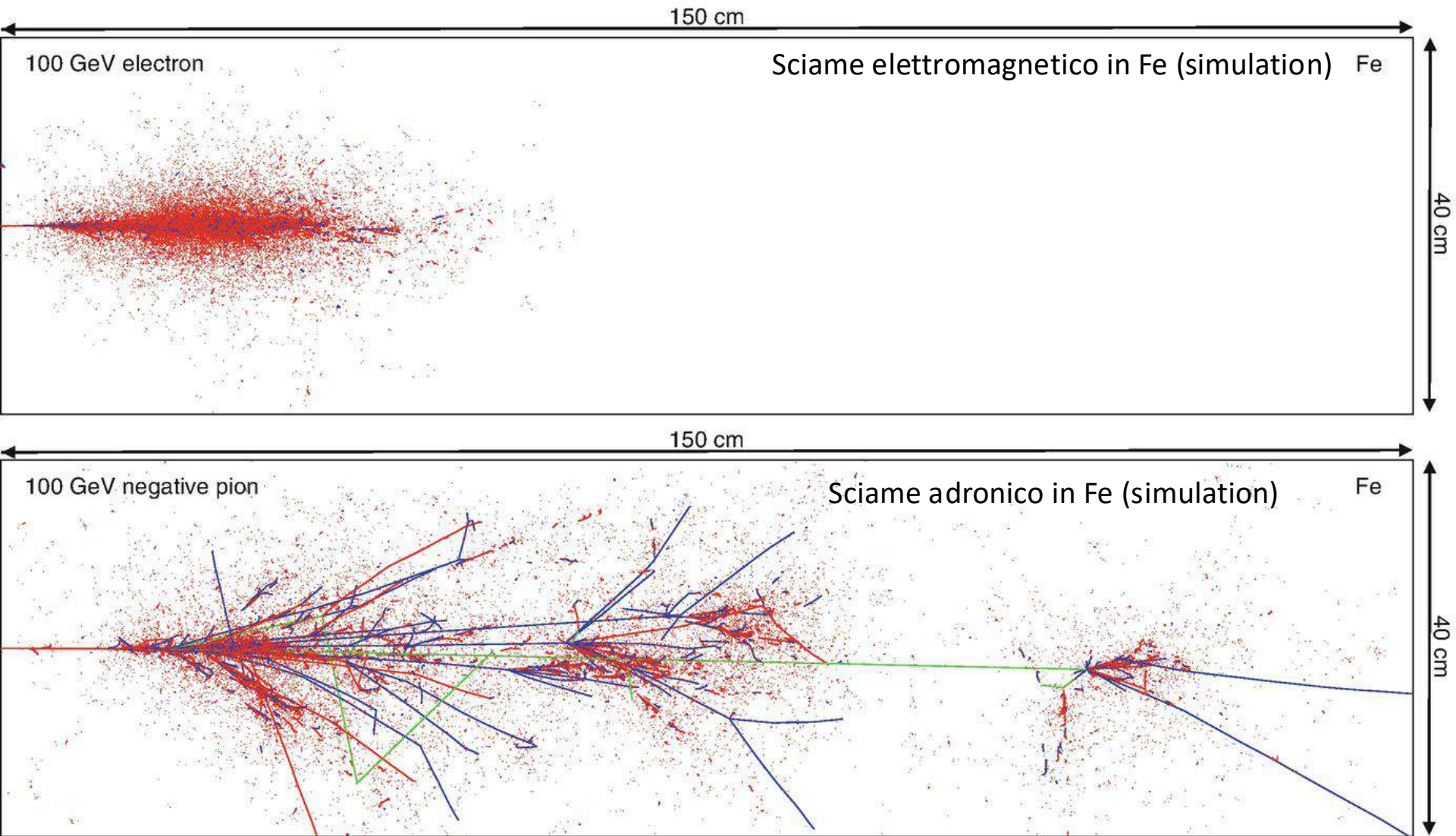


Courtesy: KLOE

Gas Electron Multiplier (GEM)

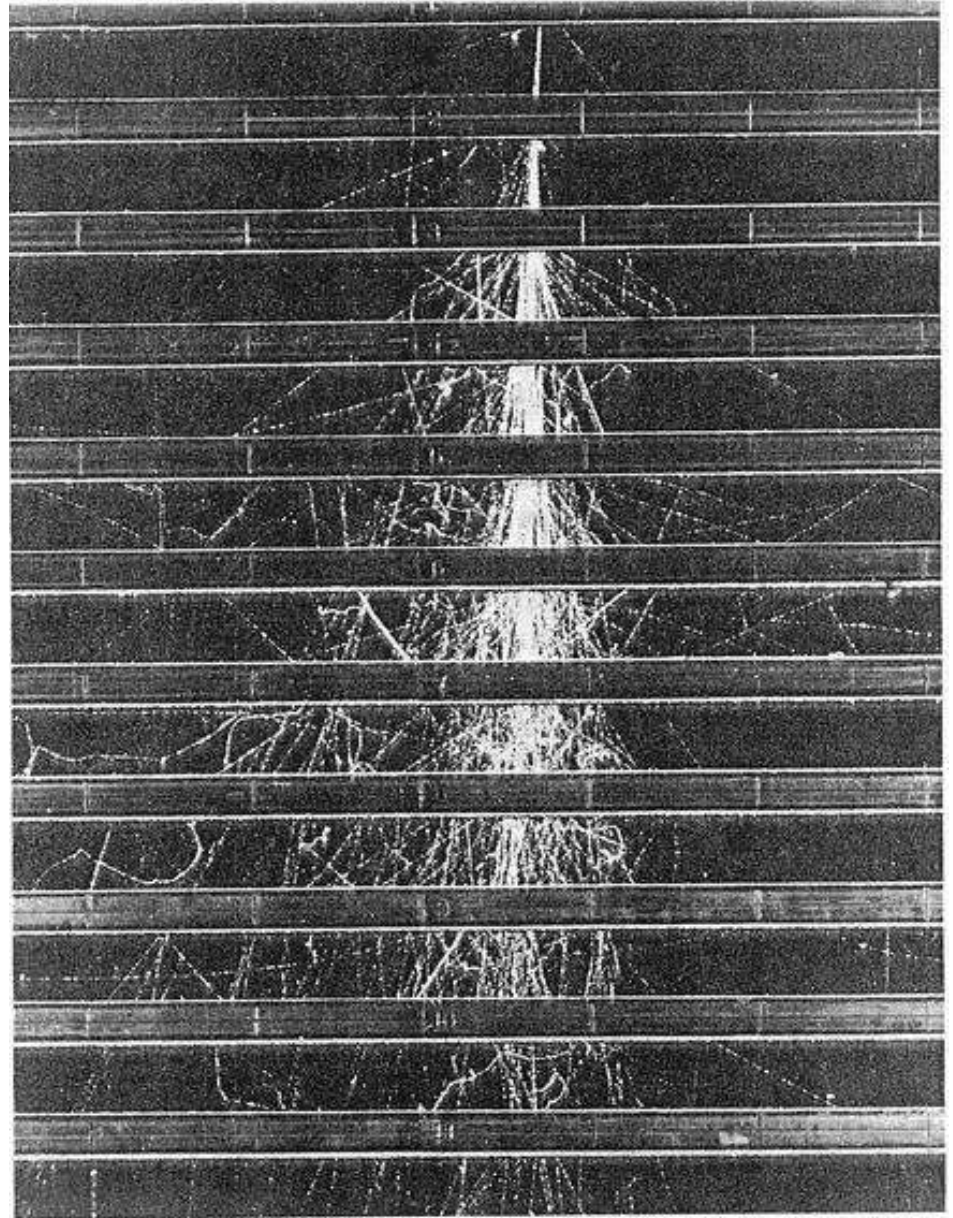
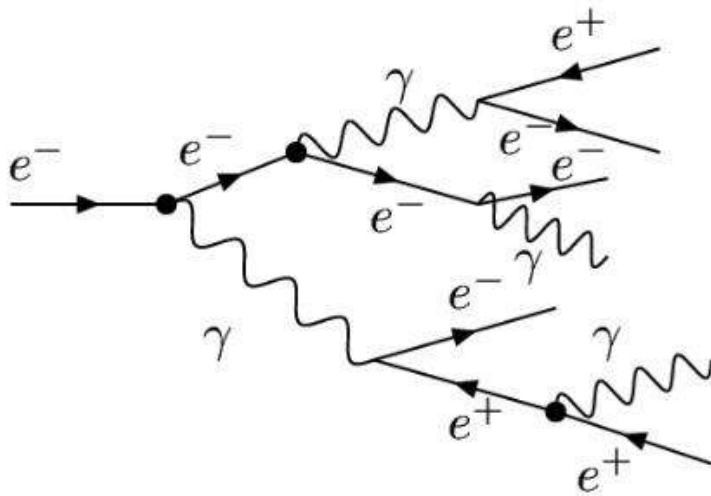
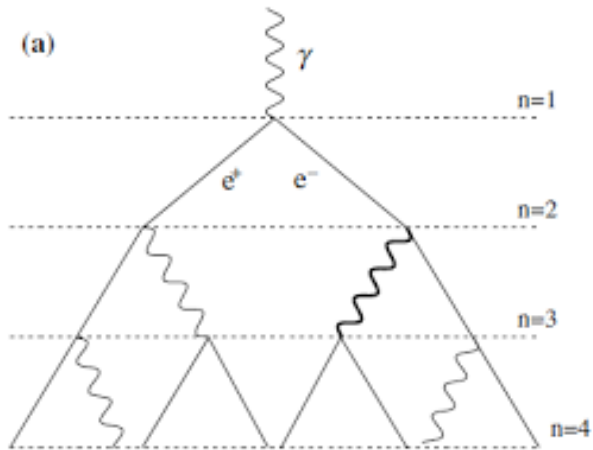


Calorimetria



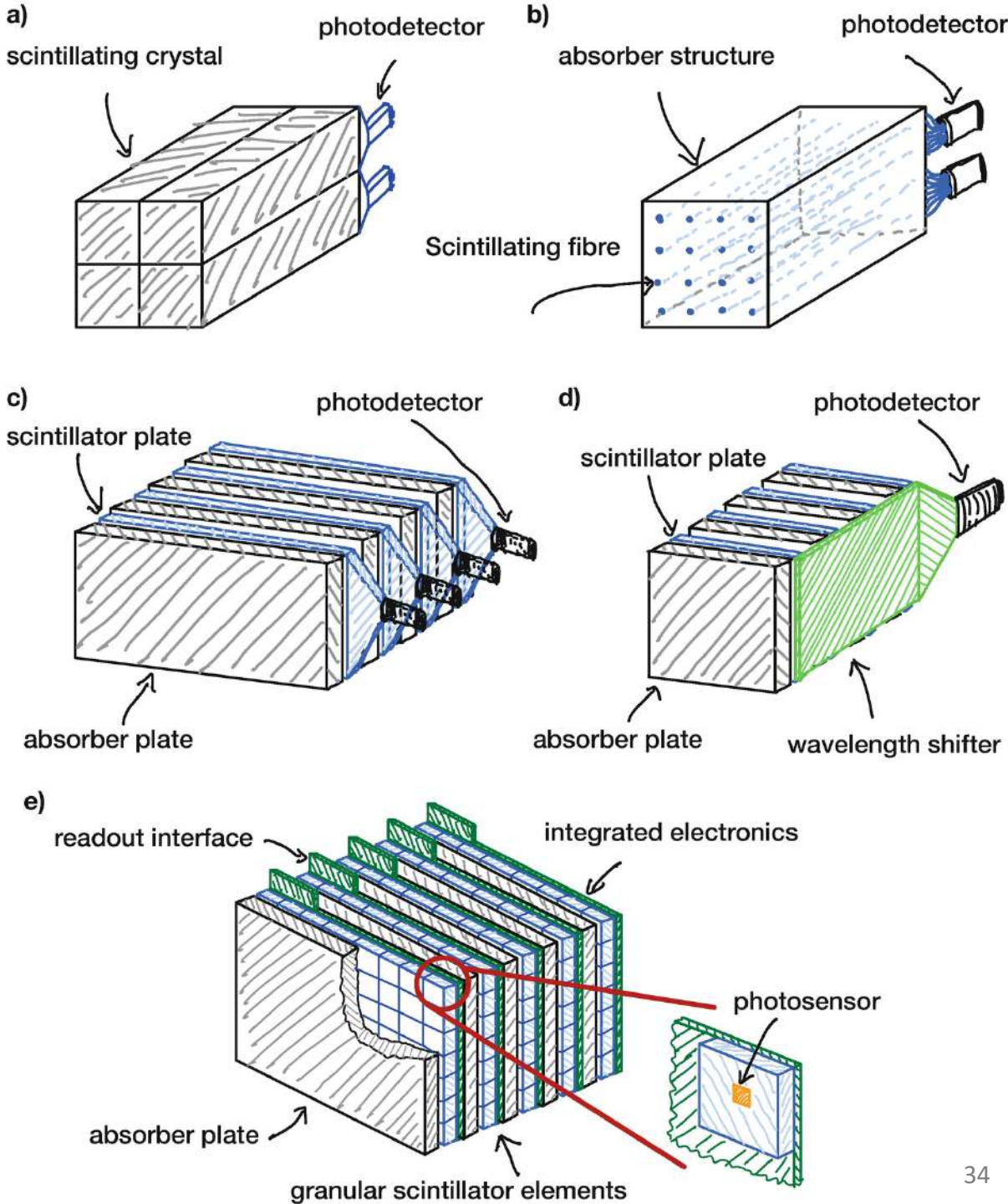
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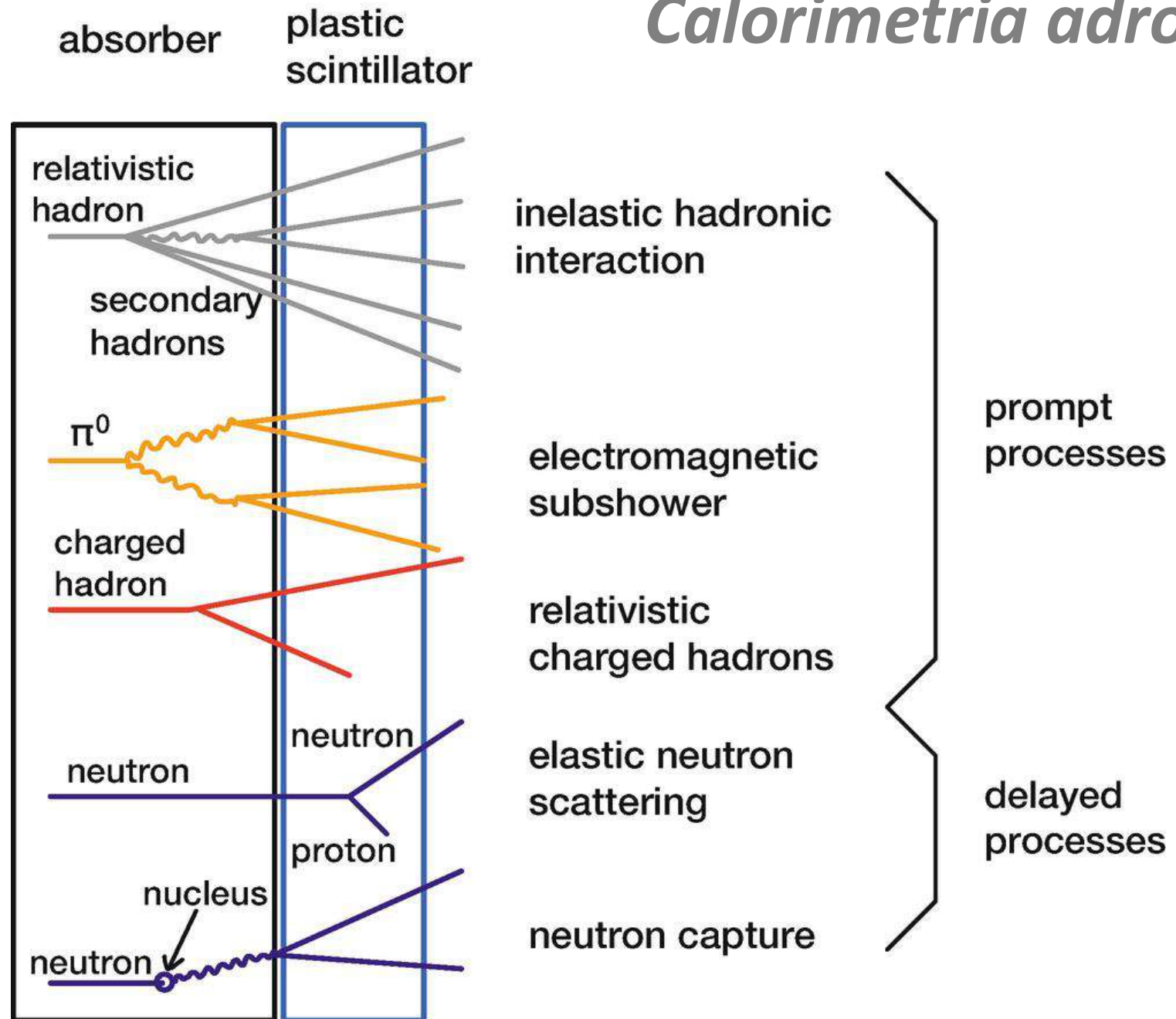


Calorimetricia

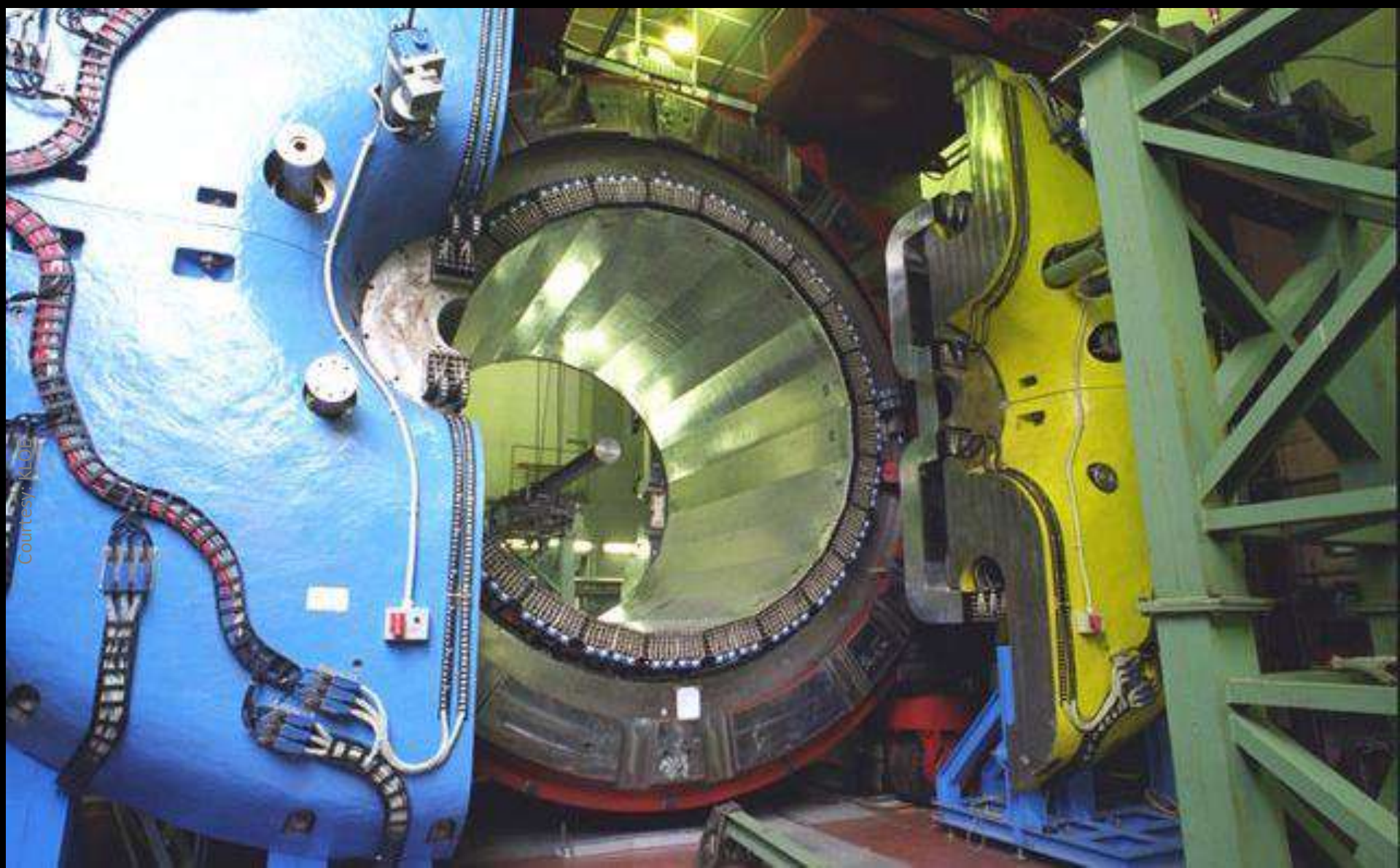
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Calorimetria adronica

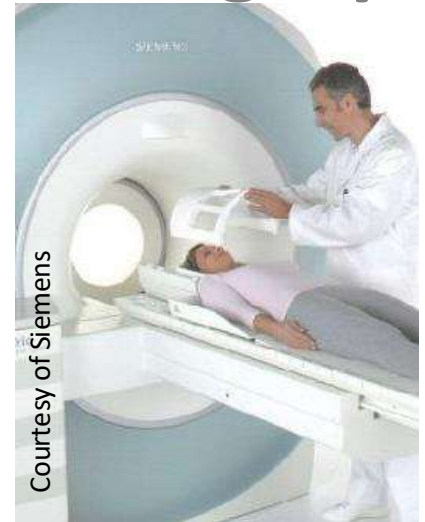
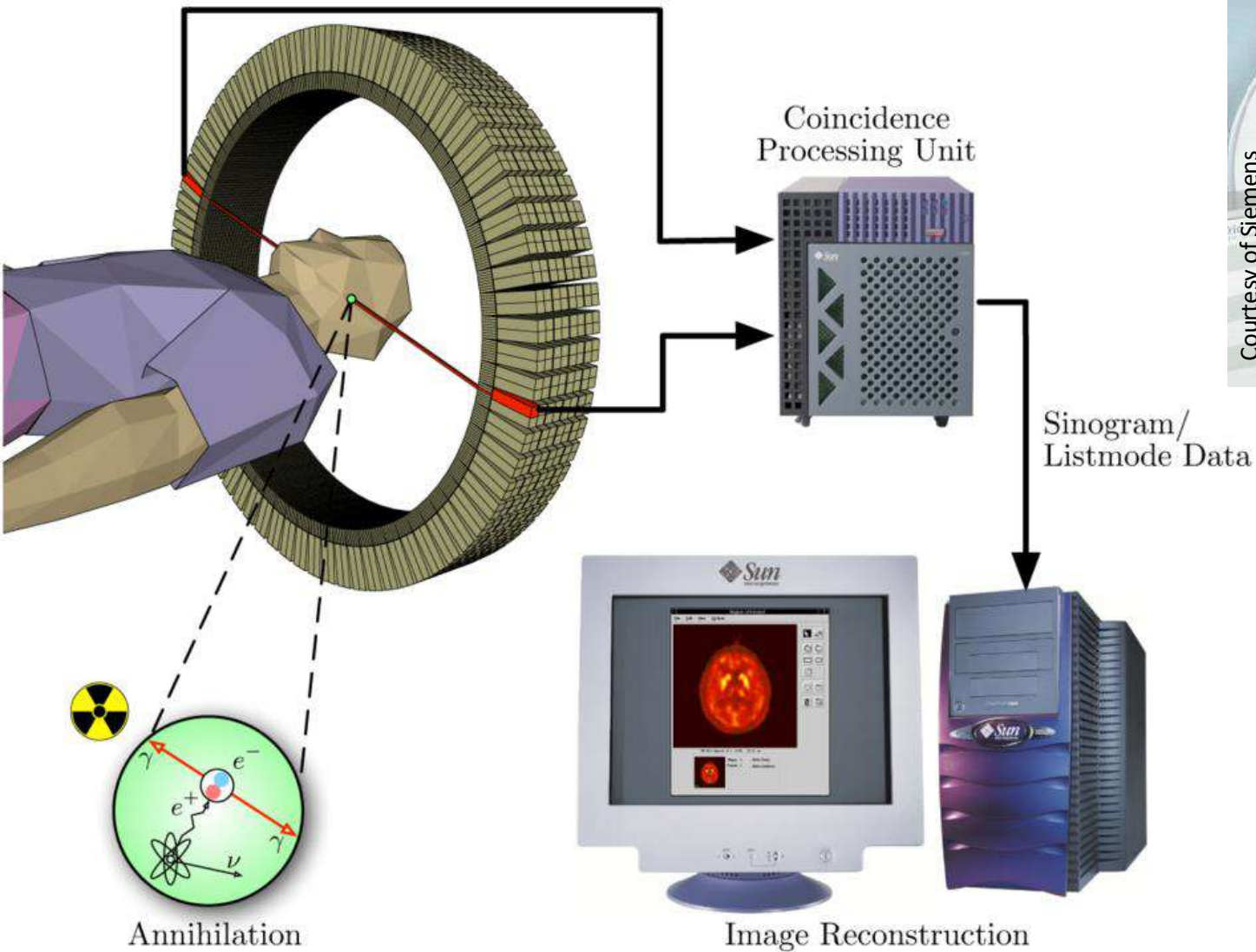


Calorimetro



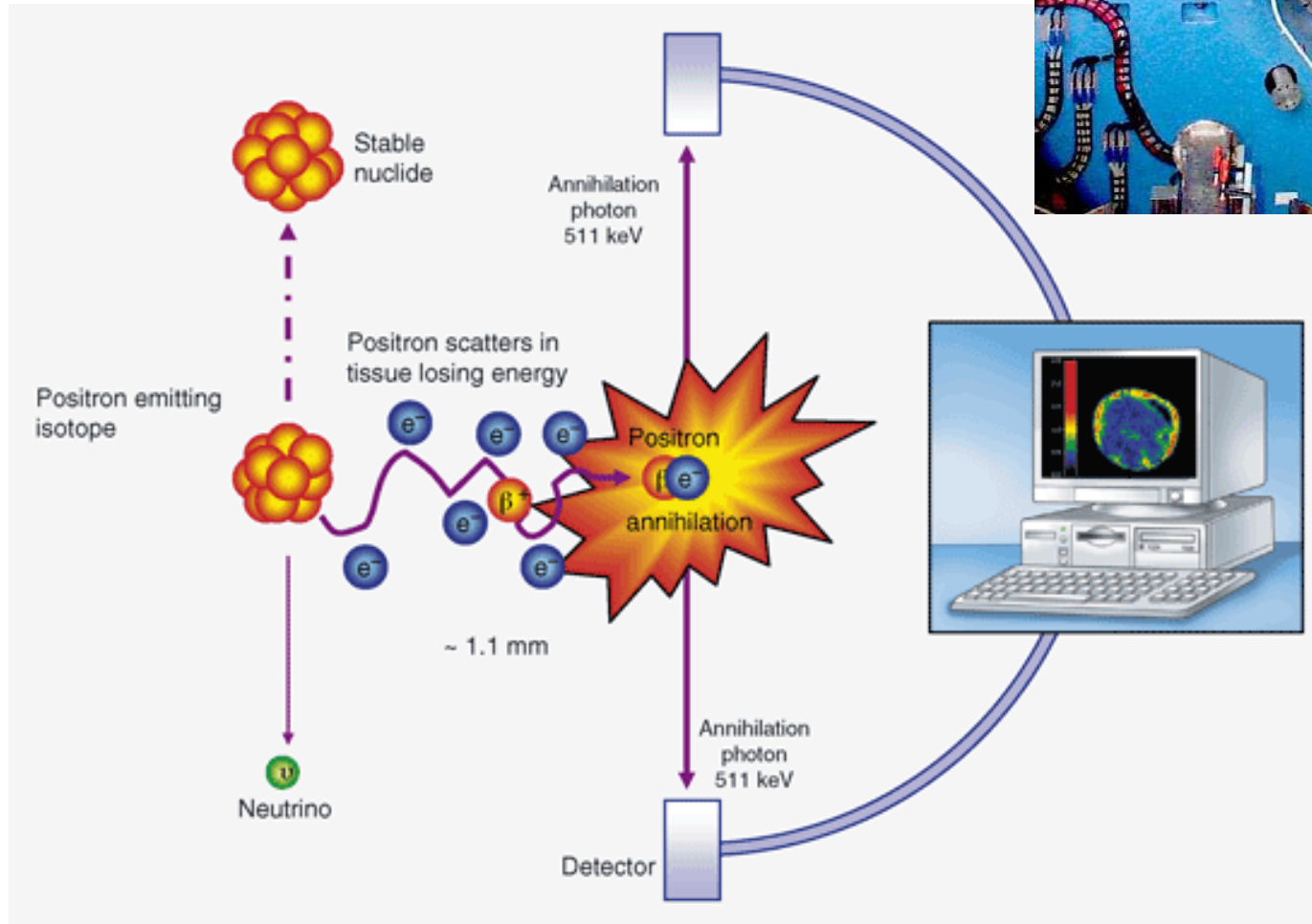
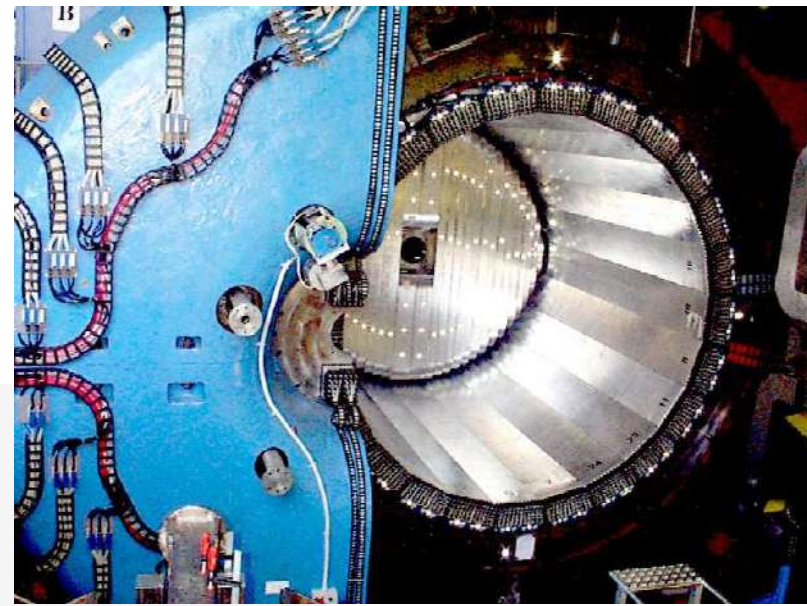
Courtesy: KLOE

Positron Emission Tomography

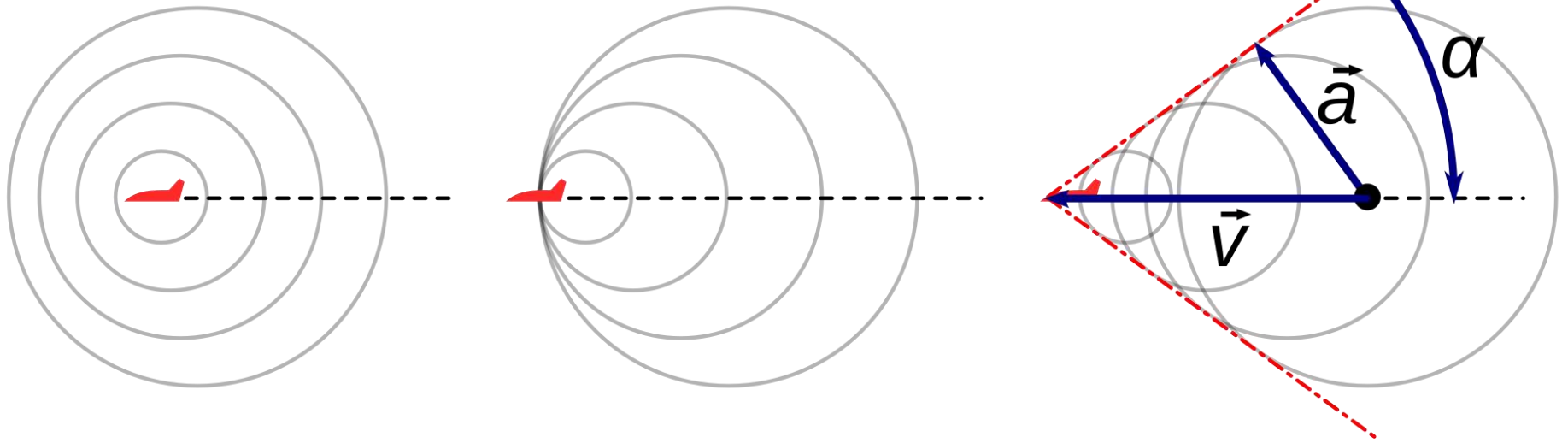


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Positron Emission Tomography



Boom supersonico

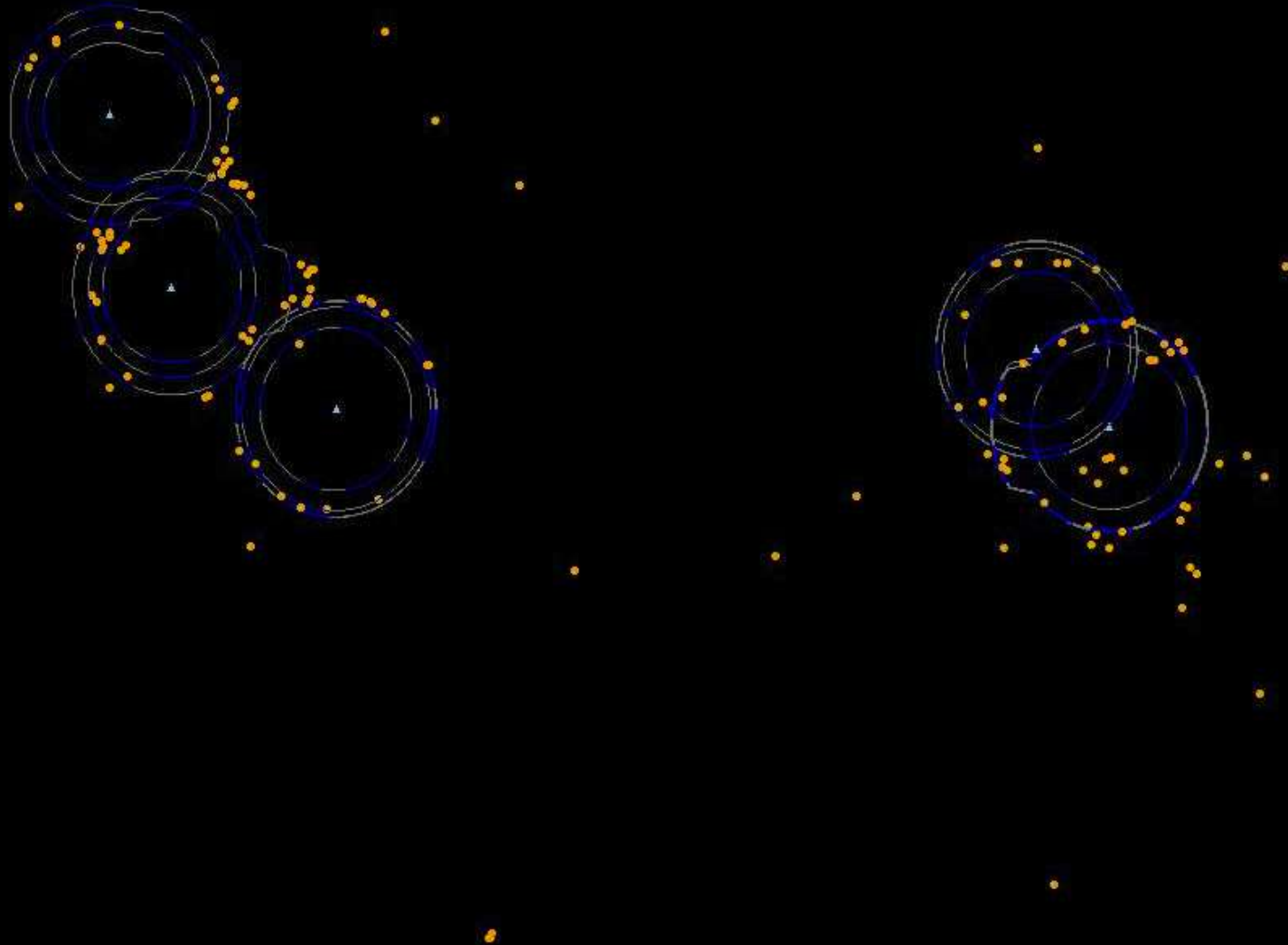


Boom supersonico

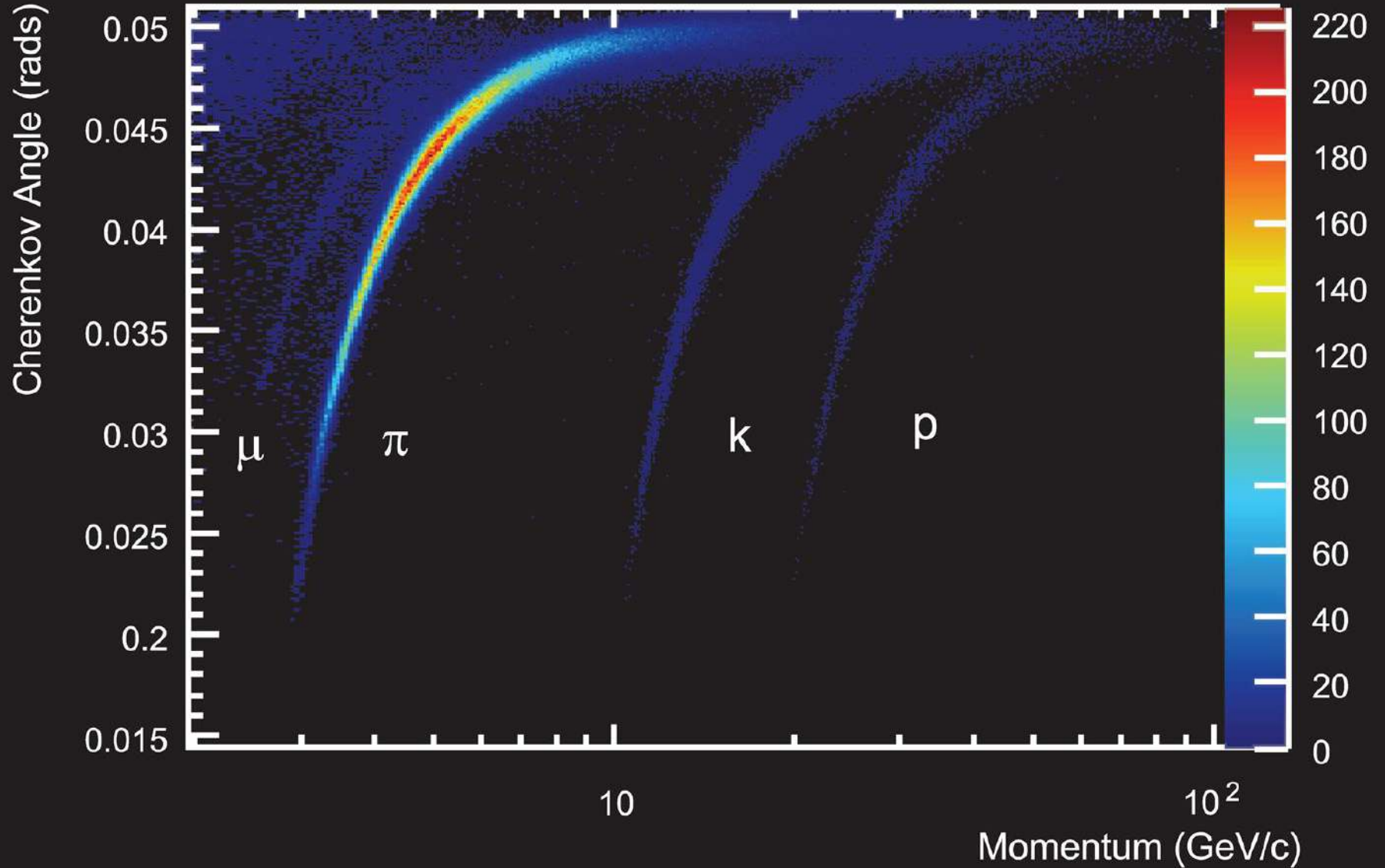


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Effetto Cherenkov



Effetto Cherenkov



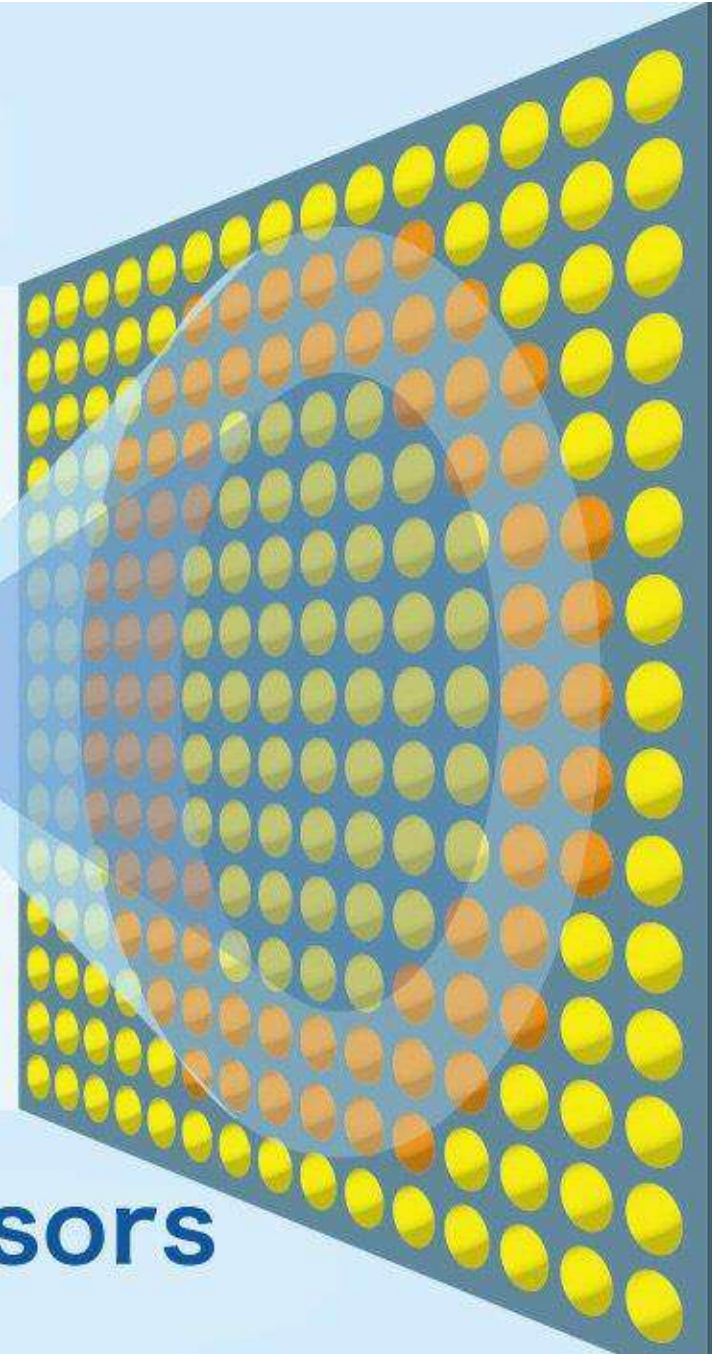
Cherenkov light

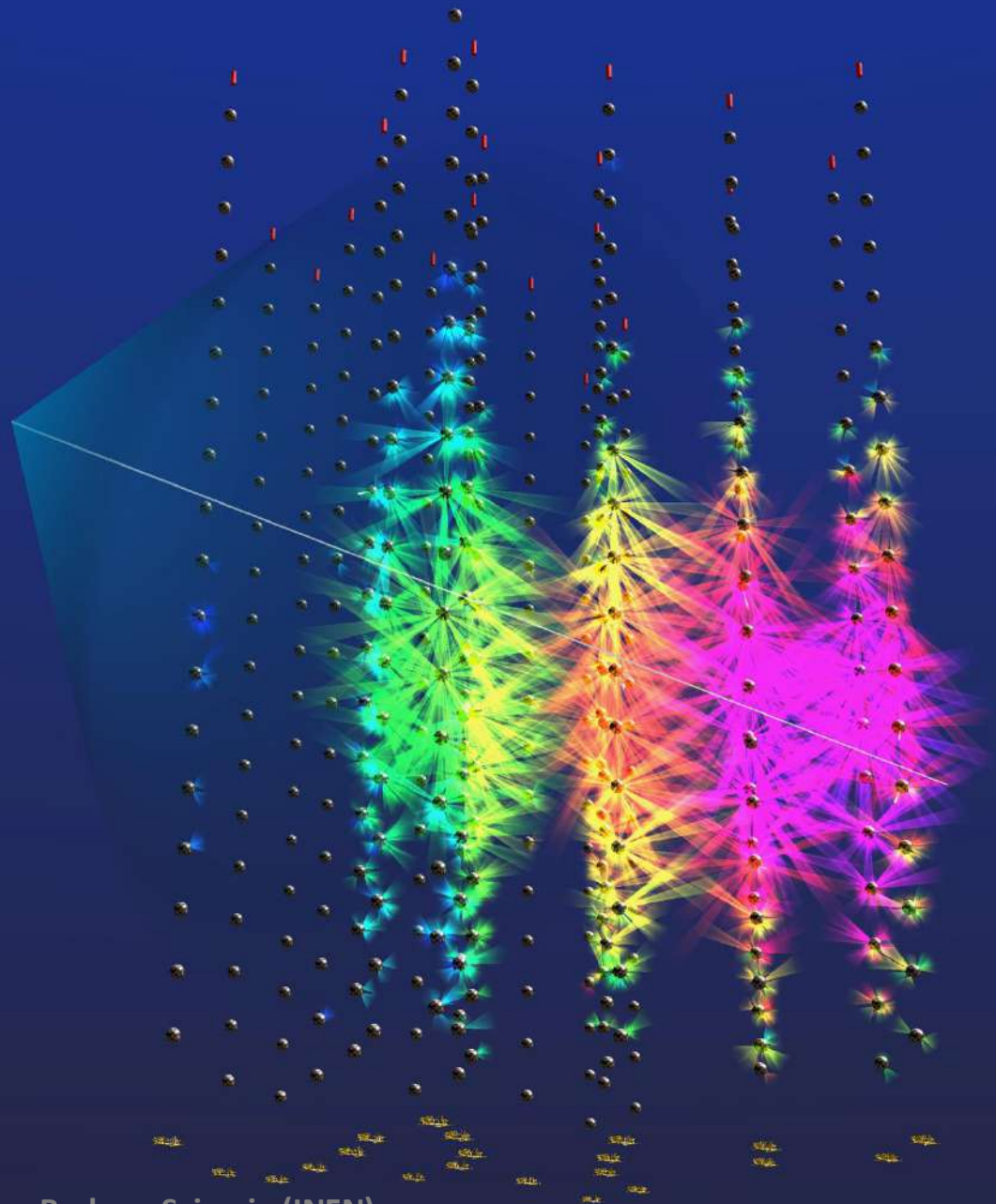
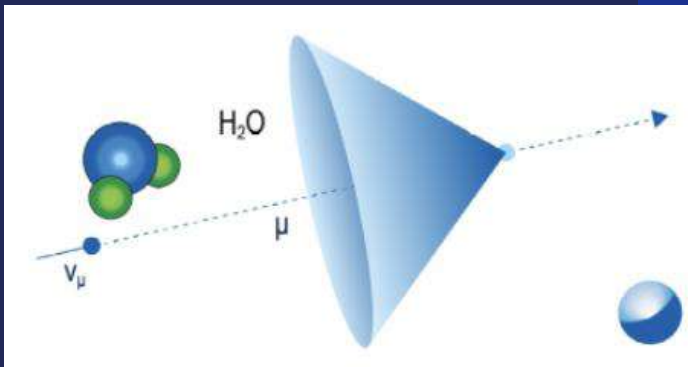
Neutrino

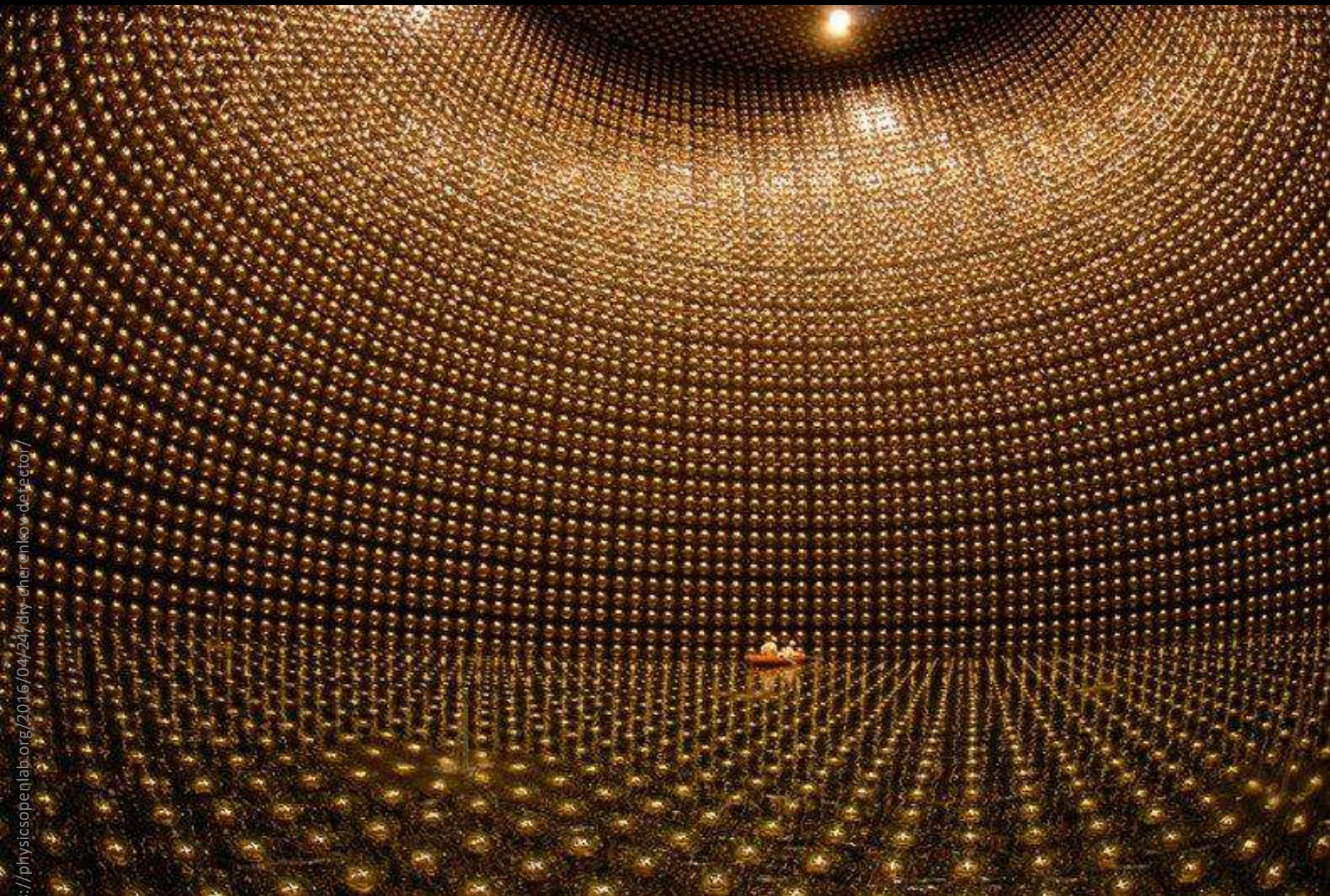


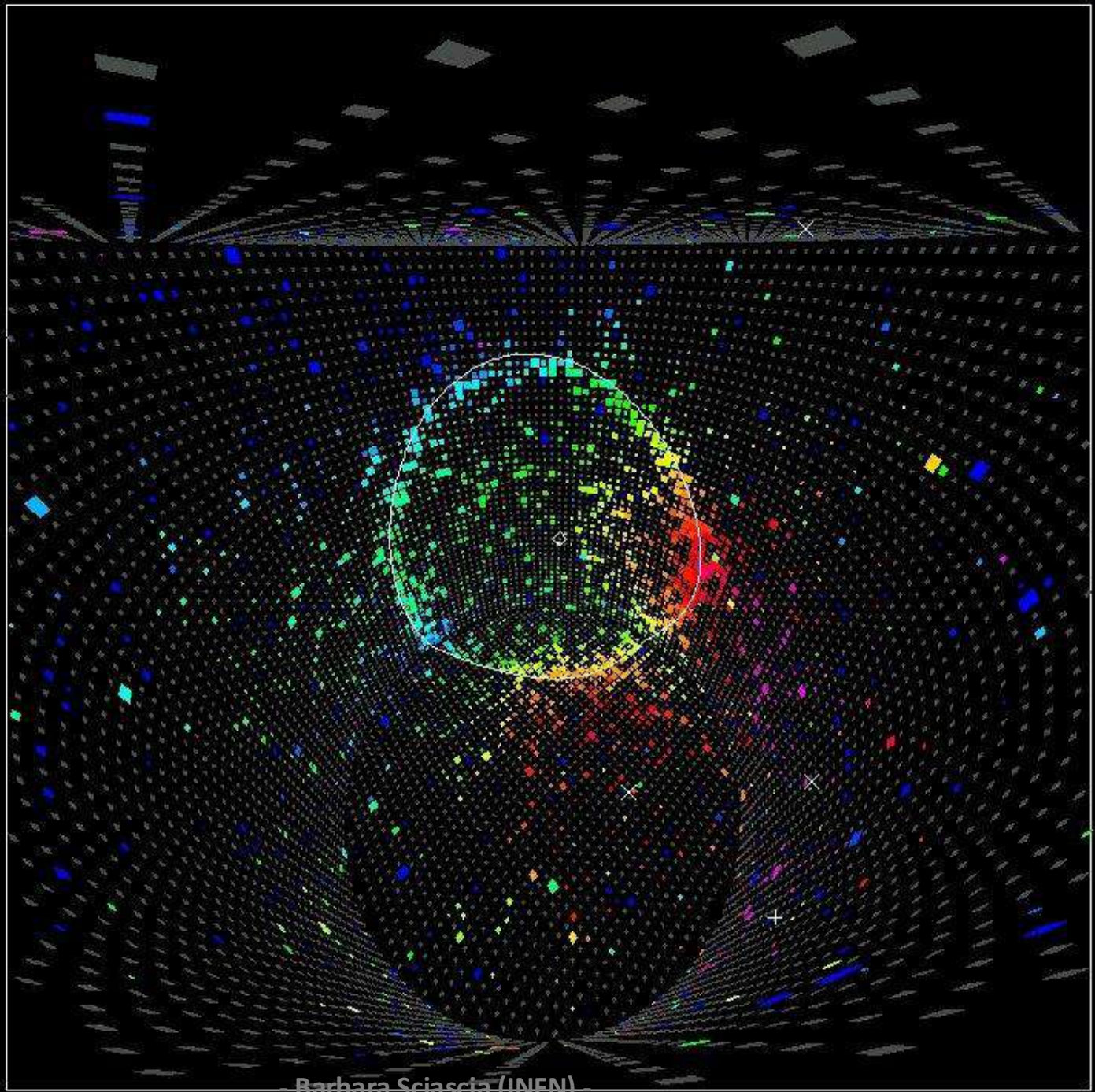
Charged particle in water

Photosensors





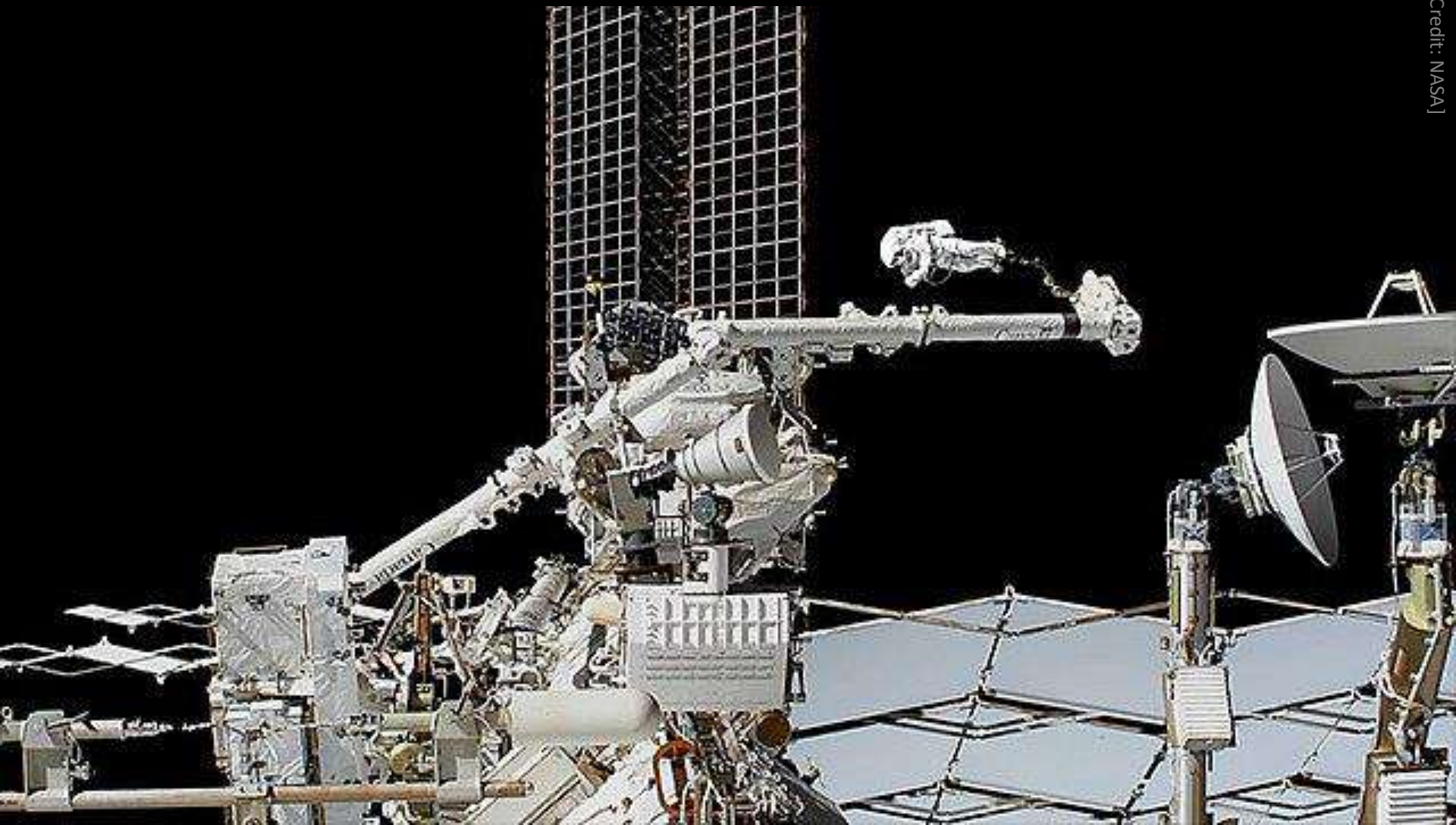




Barbara Sciascia (INFN)



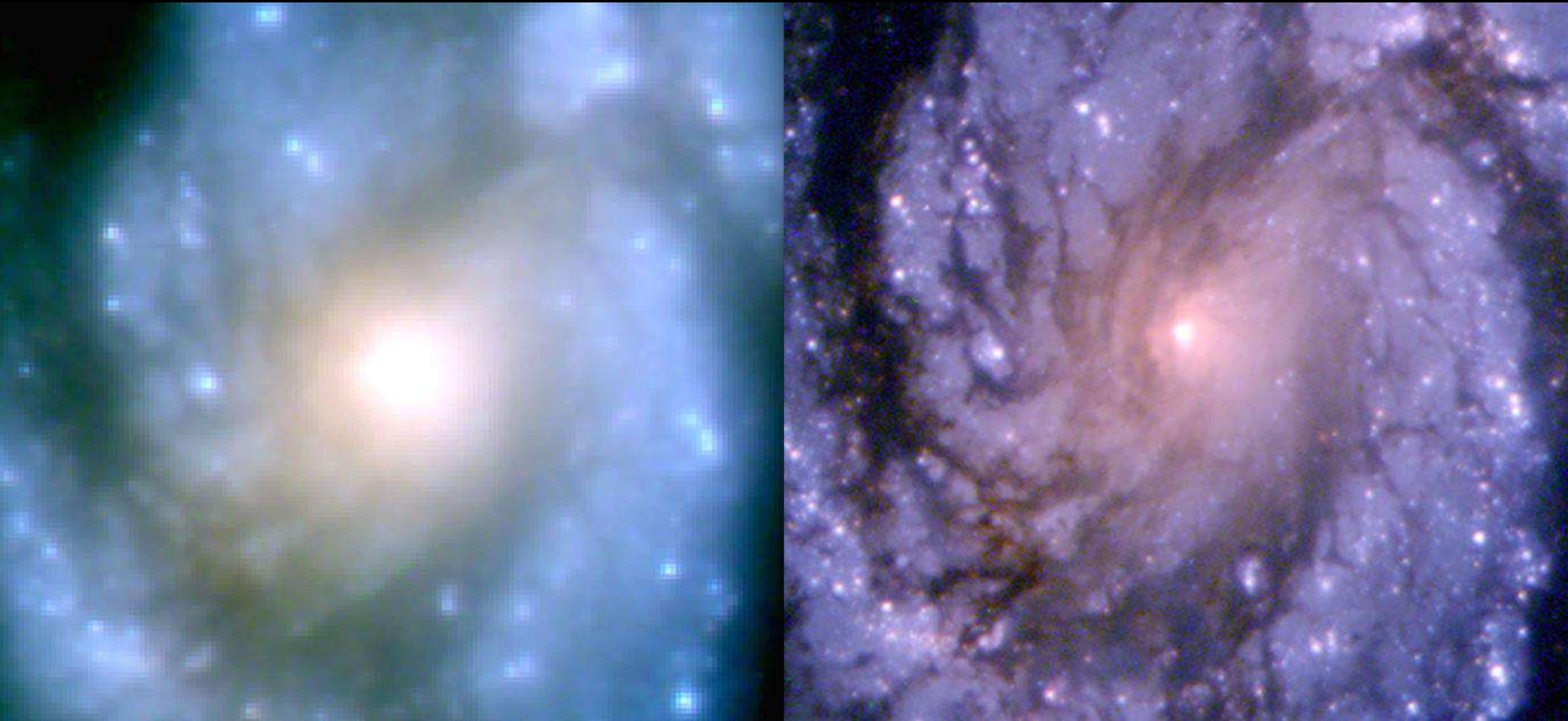
- Barbara Sciascia (INFN/LNF) -



Hubble Space Telescope



Hubble Space Telescope



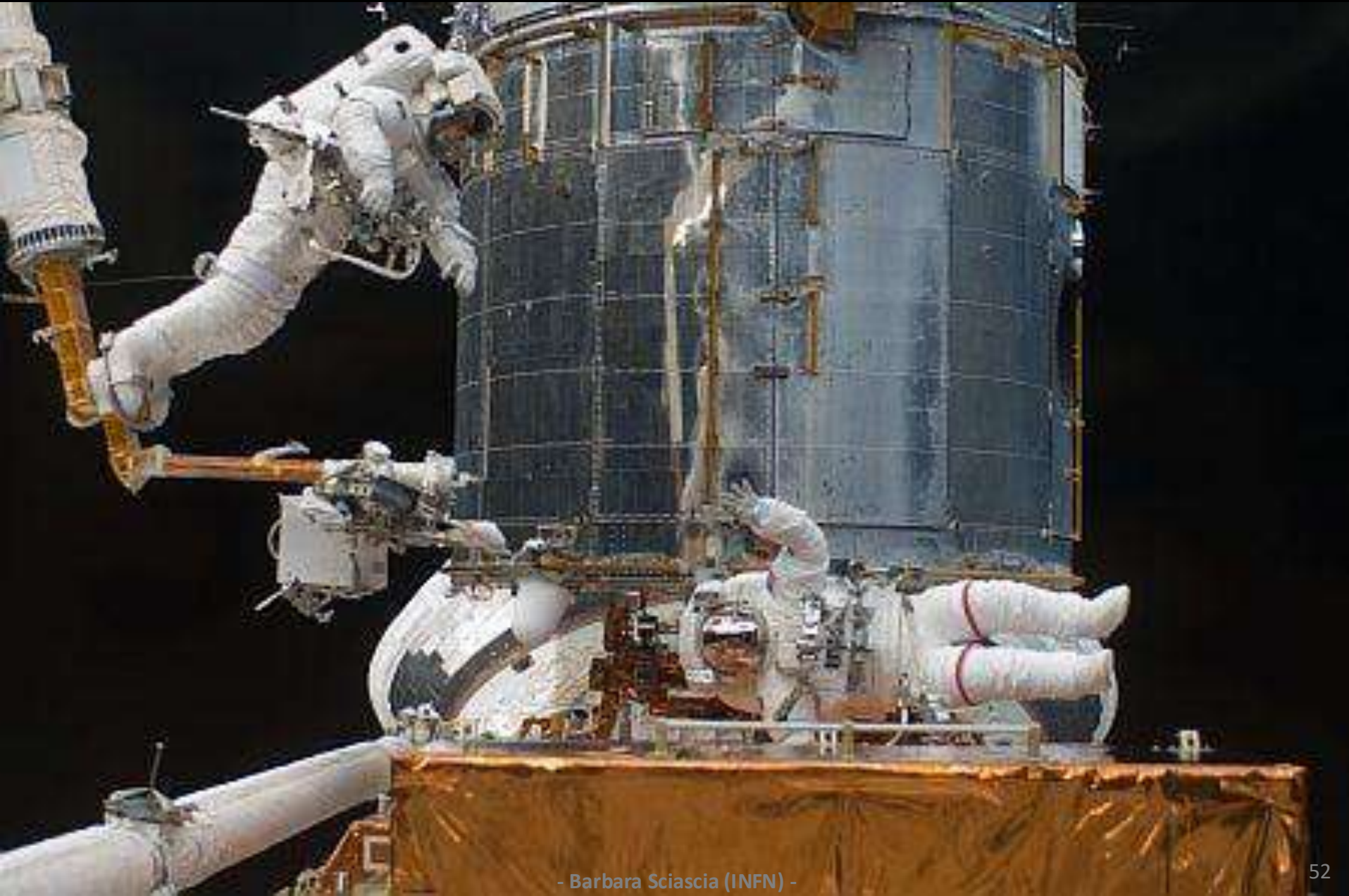
Hubble Space Telescope

<https://science.nasa.gov/mission/hubble/observatory/missions-to-hubble/>

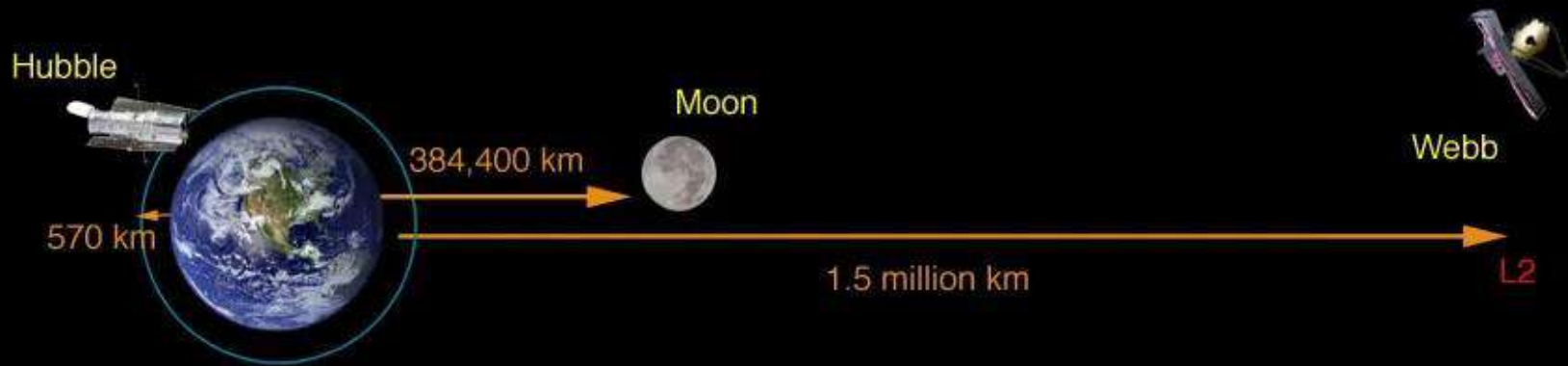
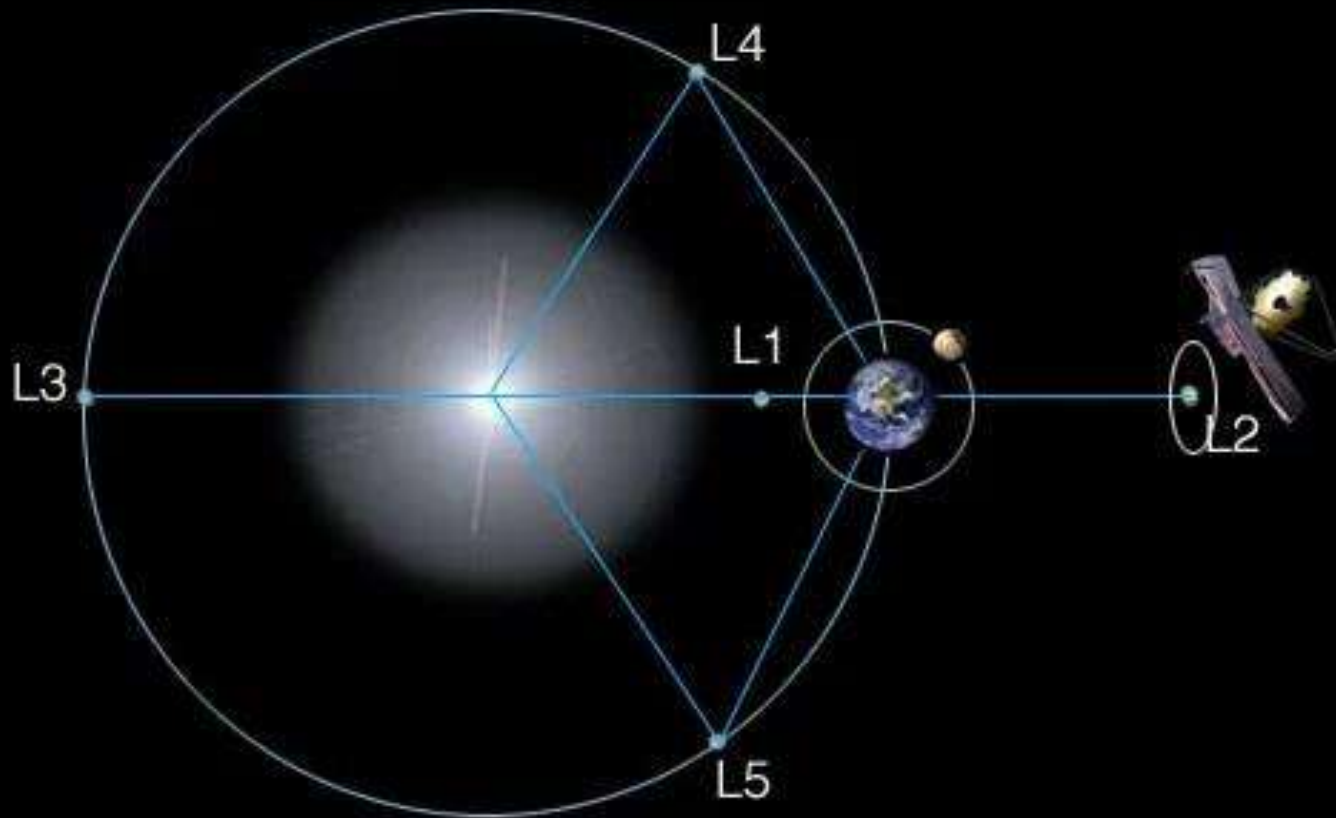


Hubble Space Telescope

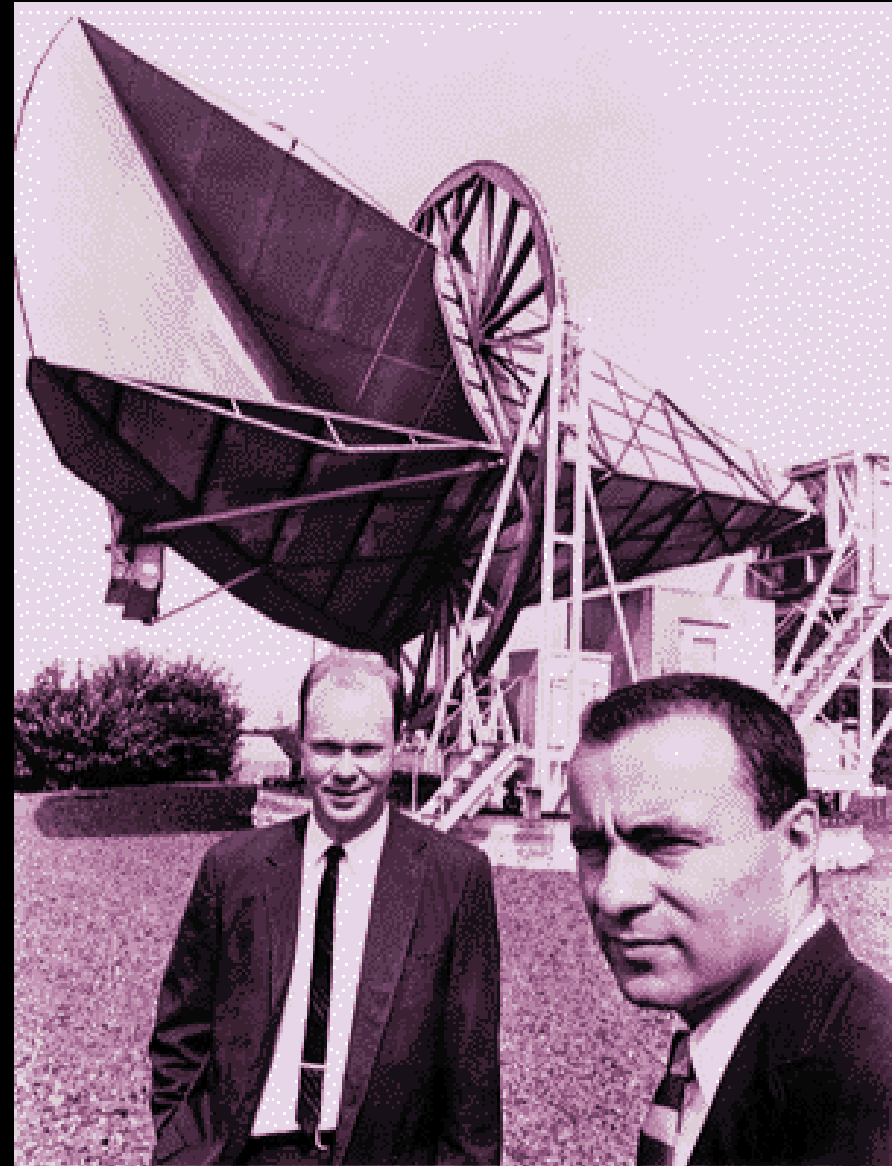
<https://science.nasa.gov/mission/hubble/observatory/missions-to-hubble/>



James Webb Space Telescope



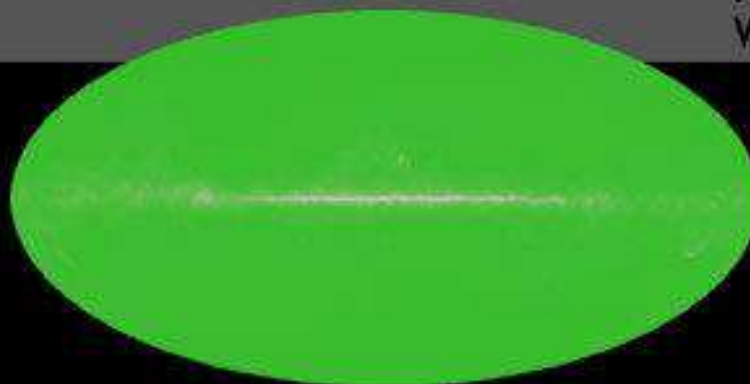
Penzias e Wilson



1965

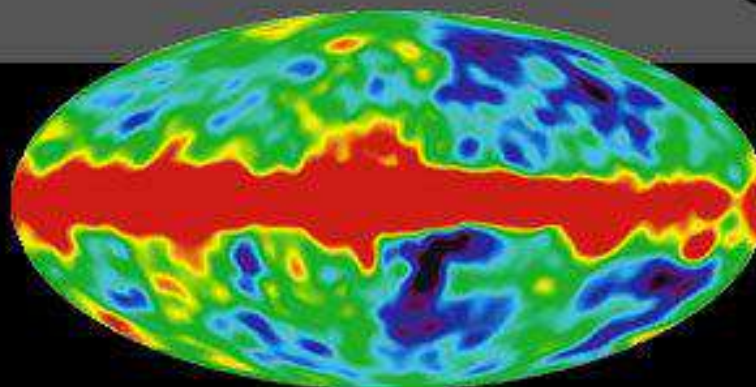
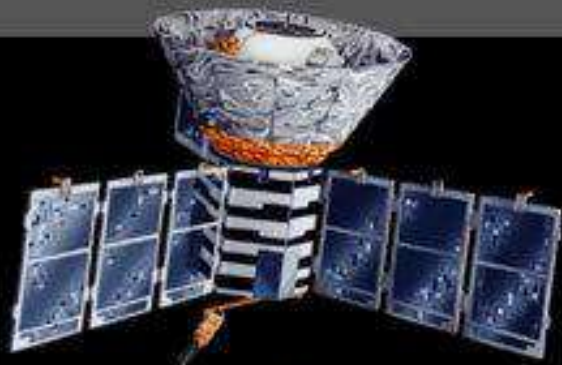


Penzias and
Wilson



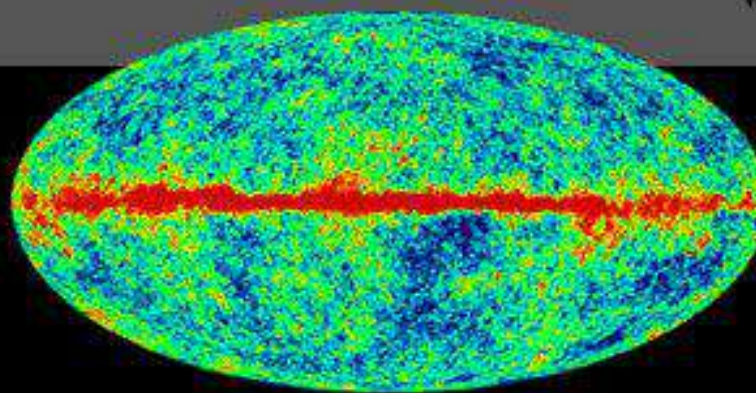
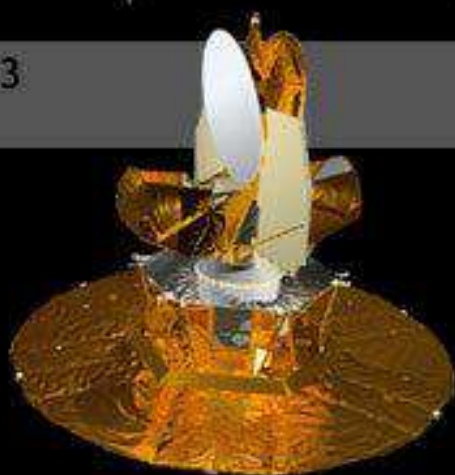
1992

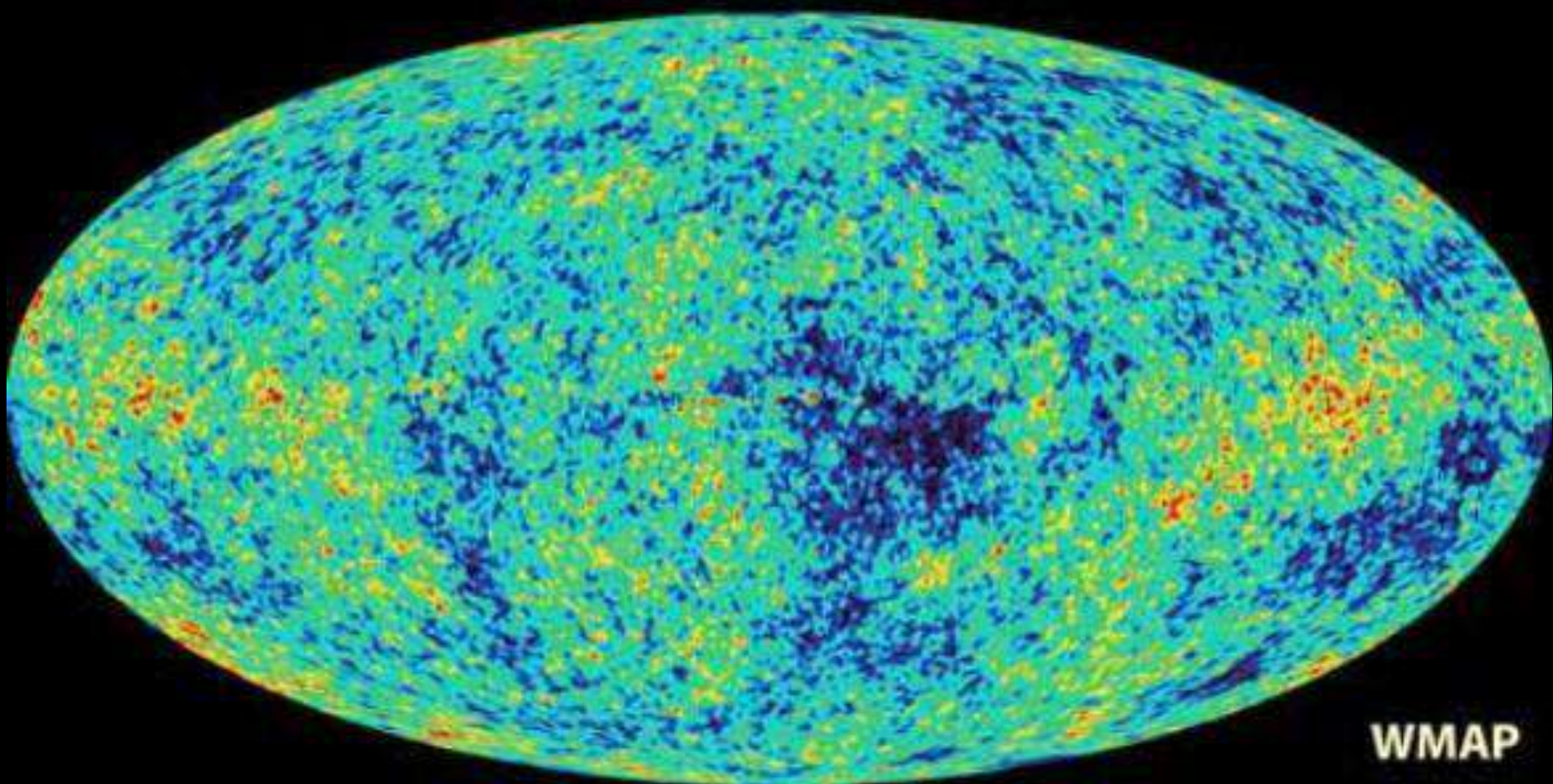
COBE



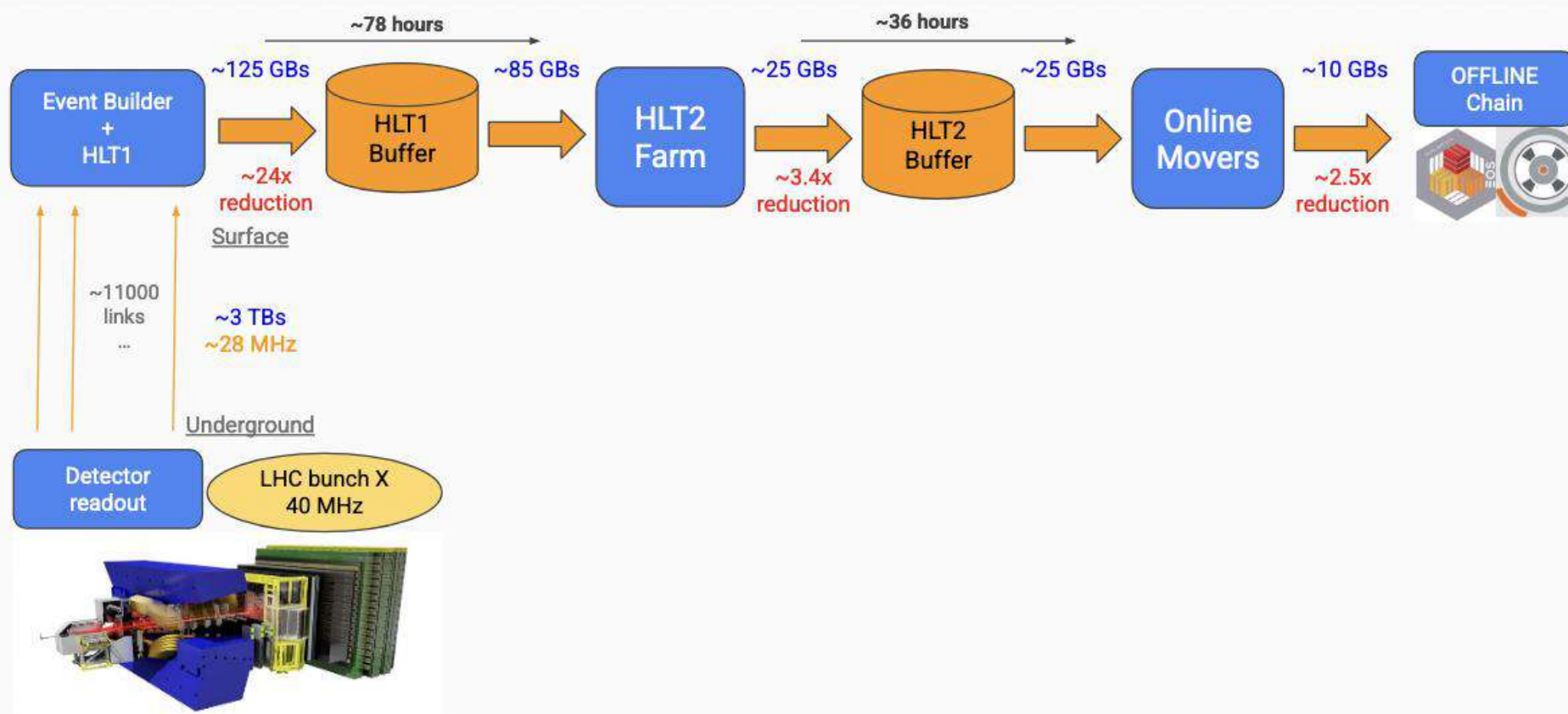
2003

WMAP



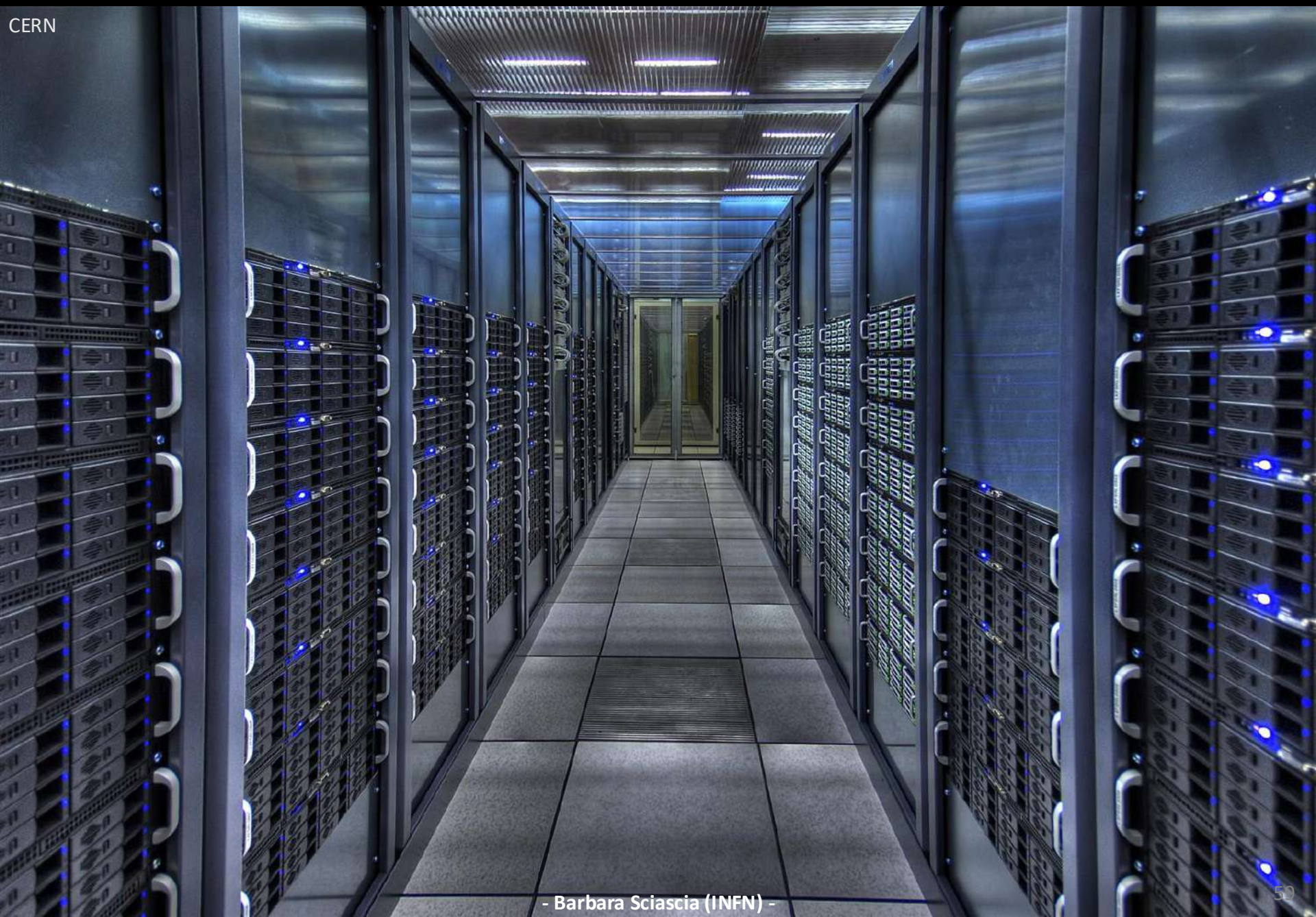


Courtesy: LHCb





CERN

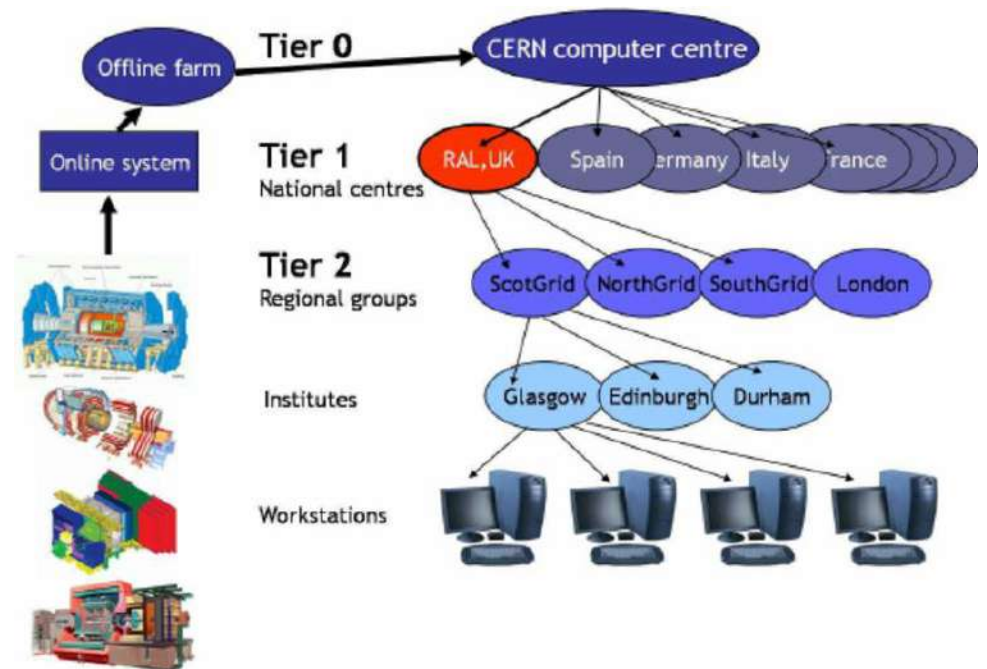
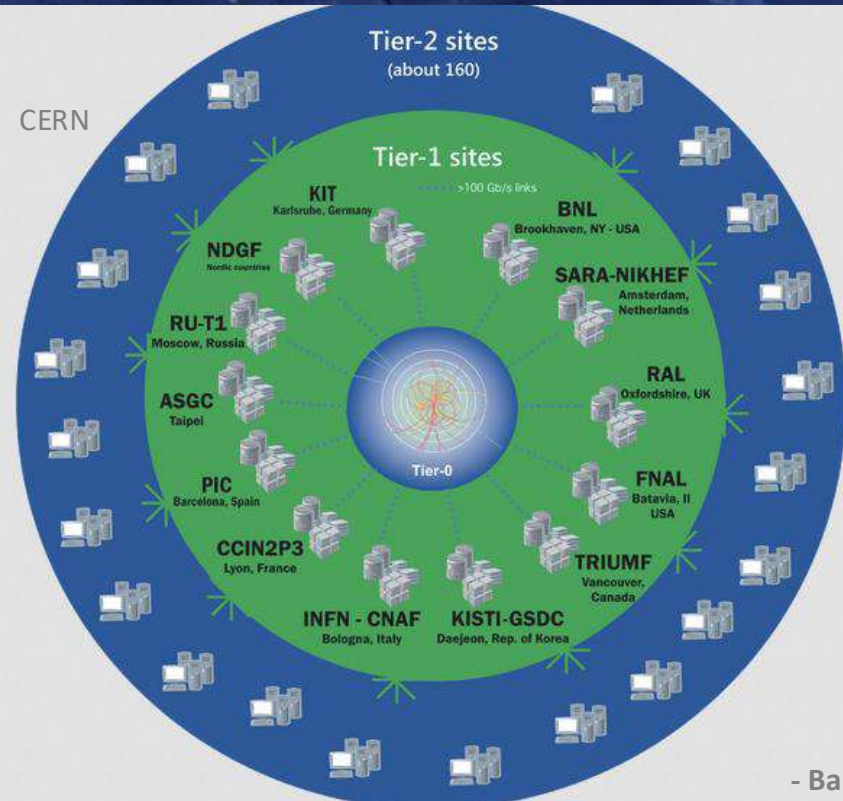


Data center (LHCb)

CERN

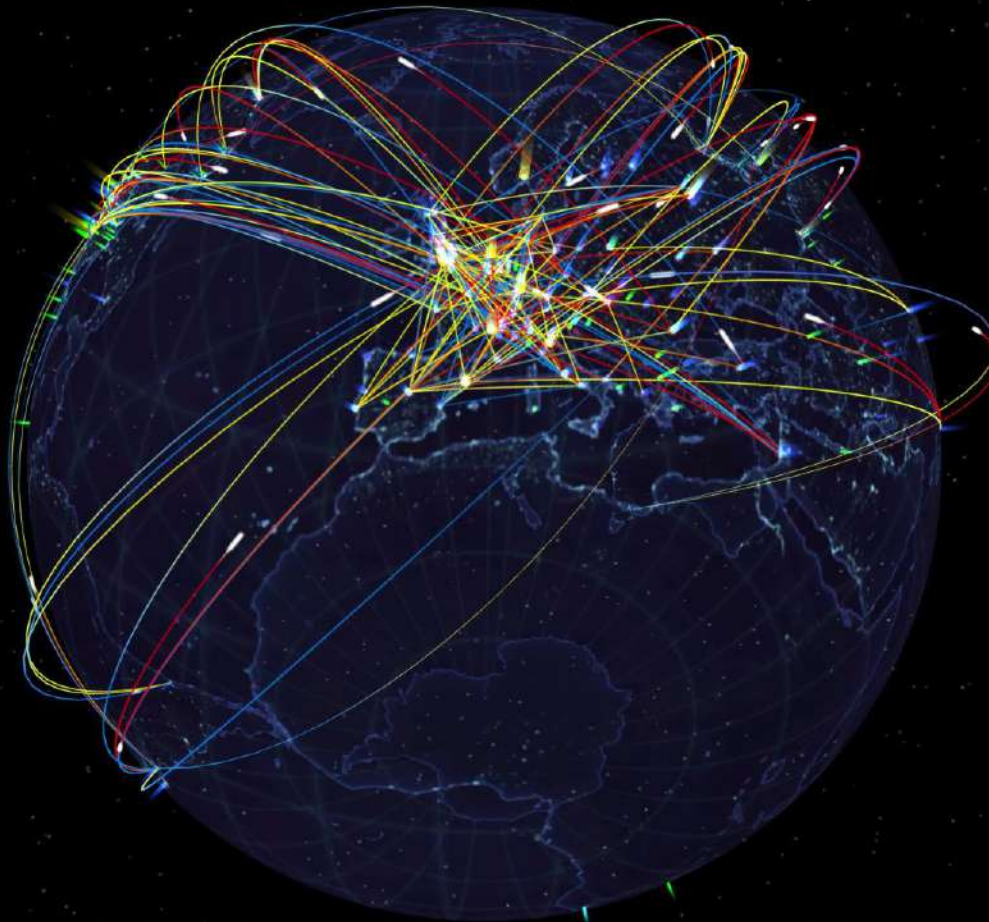


LHC Computing Grid



LHC Computing Grid

CERN



Running jobs: 365644
Active CPU cores: 807139
Transfer rate: 21.54 GiB/sec

