



CERN in 10 minutes

(well... approximately)

Mario Lassnig, Experimental Physics

Slides courtesy François Briard, International Relations



CERN

What is it ?



What does « CERN » stand for?

European

Organization for the

Research

Centre



What does « CERN » stand for?

European
Organization for
Nuclear
Research



CERN

Who is it ?













































Member states

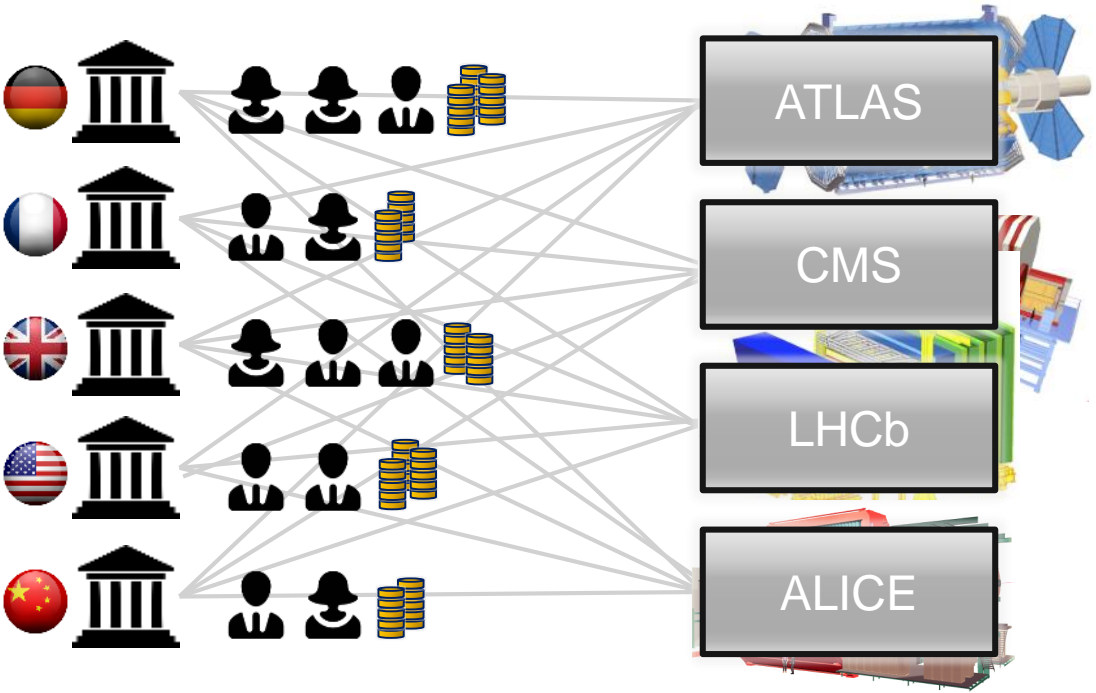


ca 1 Bn CHF



Germany		20.27%	
France		15.39%	
United Kingdom		13.88%	
Italy		11.48%	
Spain		8.28%	
Netherlands		4.60%	
Switzerland		3.64%	
Belgium		2.78%	
Poland		2.66%	
Sweden		2.61%	
Norway		2.55%	
Austria		2.22%	
Denmark		1.76%	
Greece		1.64%	
Finland		1.39%	
Portugal		1.20%	
Israel		1.19%	
Czech Republic		1.03%	
Hungary		0.65%	
Slovakia		0.50%	
Bulgaria		0.28%	

Collaborations



A world collaboration

21 members

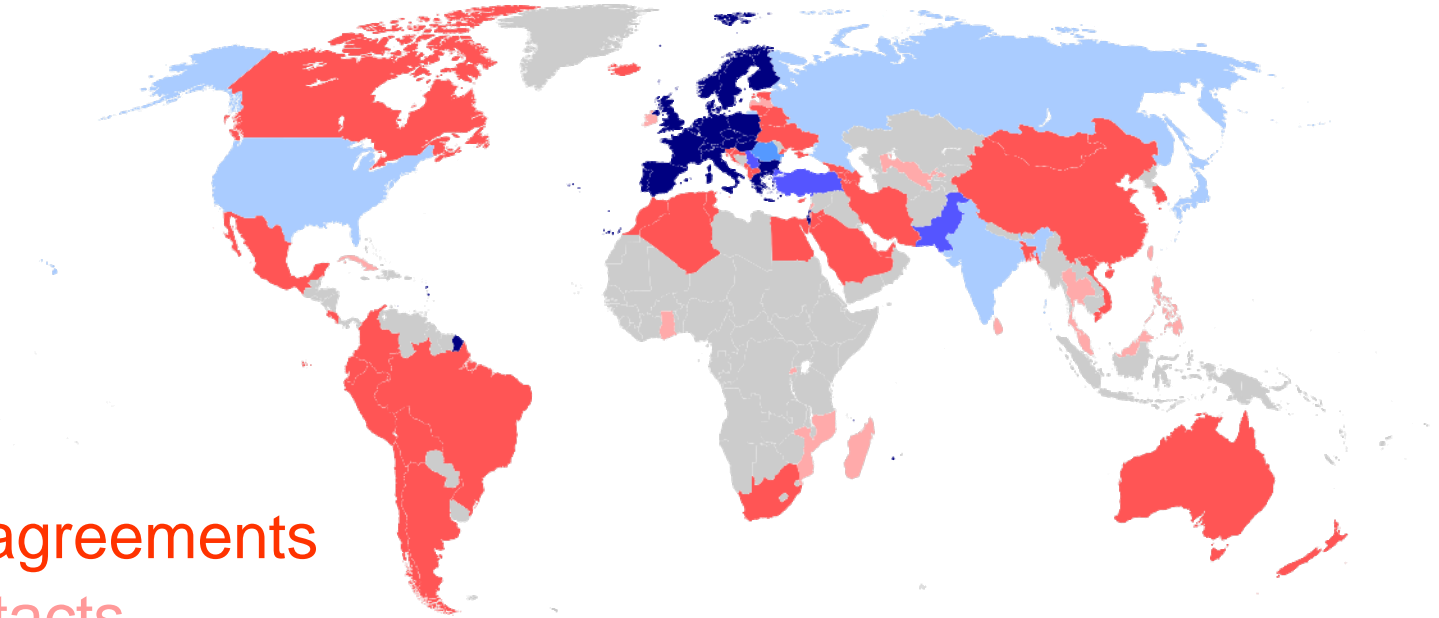
3 associates

1 candidate

Observers

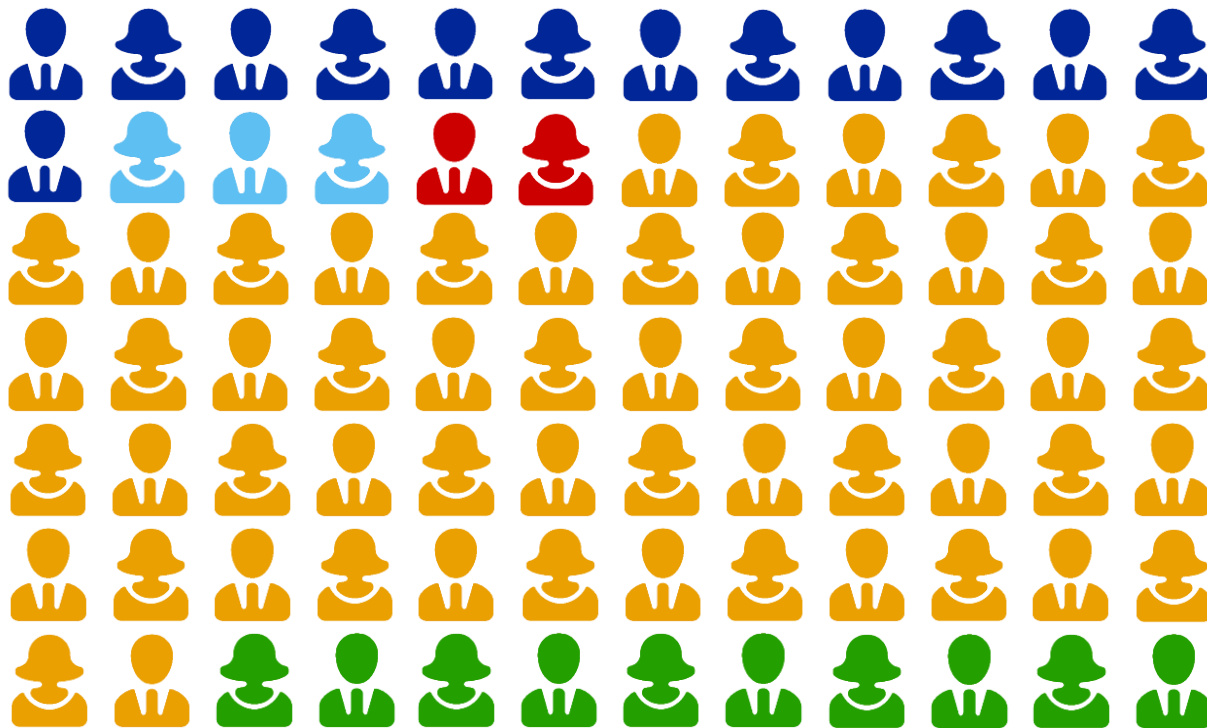
Cooperation agreements

Scientific contacts



How many persons?

+15'000!



2'500 staff

600 fellows & apprentices

500 students

11'000 users

2'000 external companies

CERN

What for ?



Fundamental research

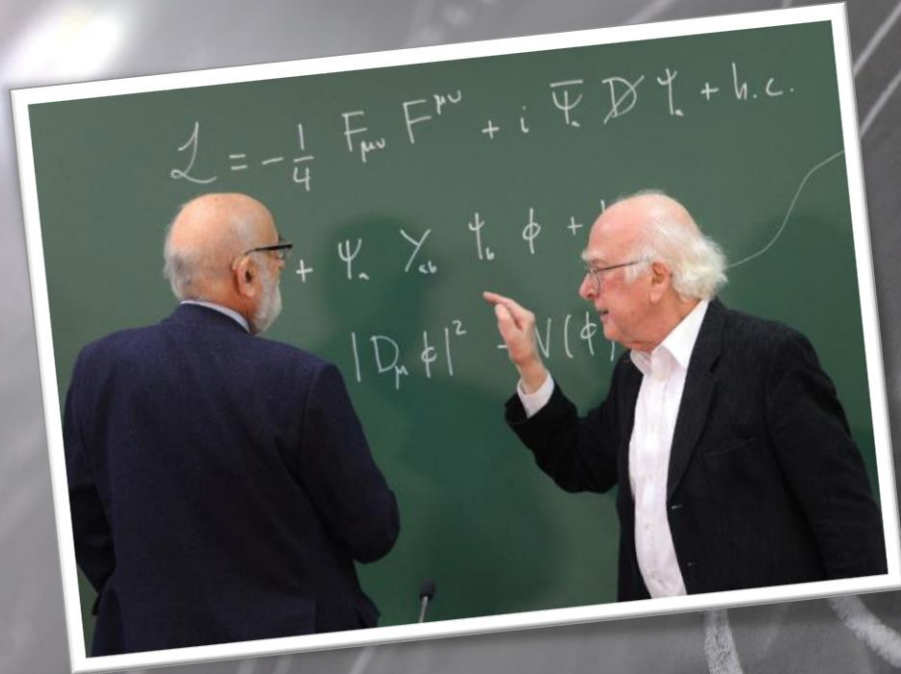


Answering questions...



Antimatter ?

Answering questions...



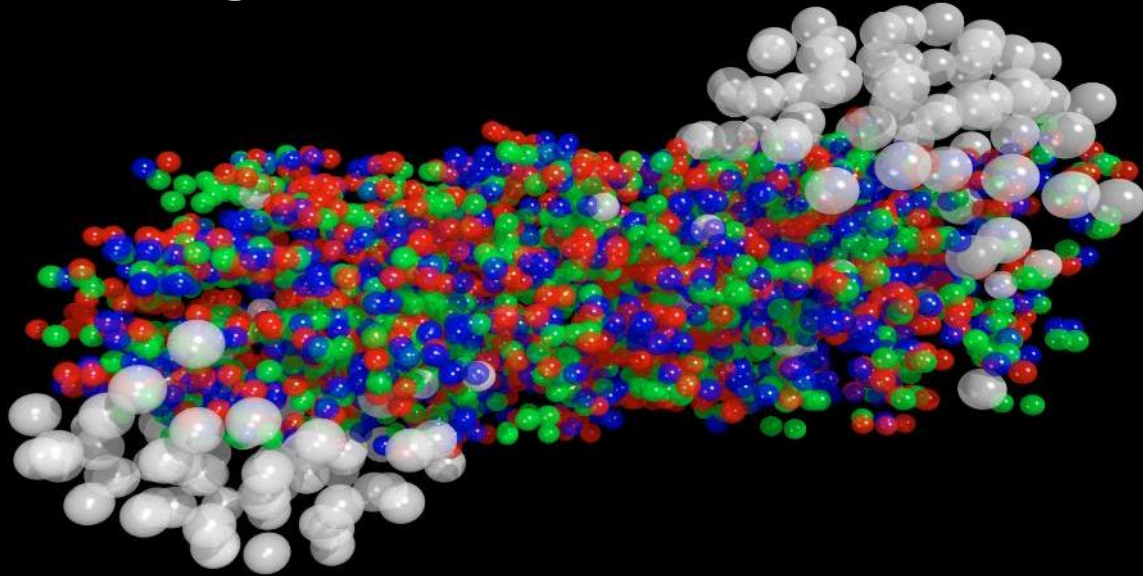
Higgs

Higgs ?

Answering questions...

Dark matter ?

Answering questions...



Quark-gluon plasma ?

Collaborate



Educate



CERN

How does it work ?



Accelerating and colliding



Incredible levels of energy

$$-\frac{\hbar^2}{2m} \frac{d^2\psi}{dx^2} + V\psi = E\psi$$

$$\Phi = \frac{1}{2\pi} \int \dots$$

$$E_f = \frac{1}{m} \dots$$

$$U = W_{AB} = |E_{PA} - E_{PB}| = |\varphi_A - \varphi_B|$$

$$v = \frac{wh}{2\pi r m_e}$$

$$\varphi_E = \frac{E_e}{\varphi_0} = k \frac{\varphi}{r}$$

$$m = N \cdot m_0 = \frac{Q}{v_e} \frac{M_m}{N_A}$$

$$E = \frac{E_c}{a} \int_{-a/L}^{+a/L} \sin(\omega t + \phi) dy$$

$$R_m = \frac{C}{T} k = \pm \sqrt{\frac{2m}{\hbar^2} (E - V_0)}$$

$$\omega = 2\pi f$$

$$E = mc^2$$

$$\beta = \frac{\Delta I c}{\dots}$$

$$\vec{S} = \frac{1}{\mu_0} (\vec{E} \times \vec{B})$$

$$\oint \vec{D} \cdot d\vec{S} = Q^*$$

$$E = \hbar k^2 \quad 1 \text{ pc} = \frac{1 \text{ AU}}{\dots}$$



Accelerators chain

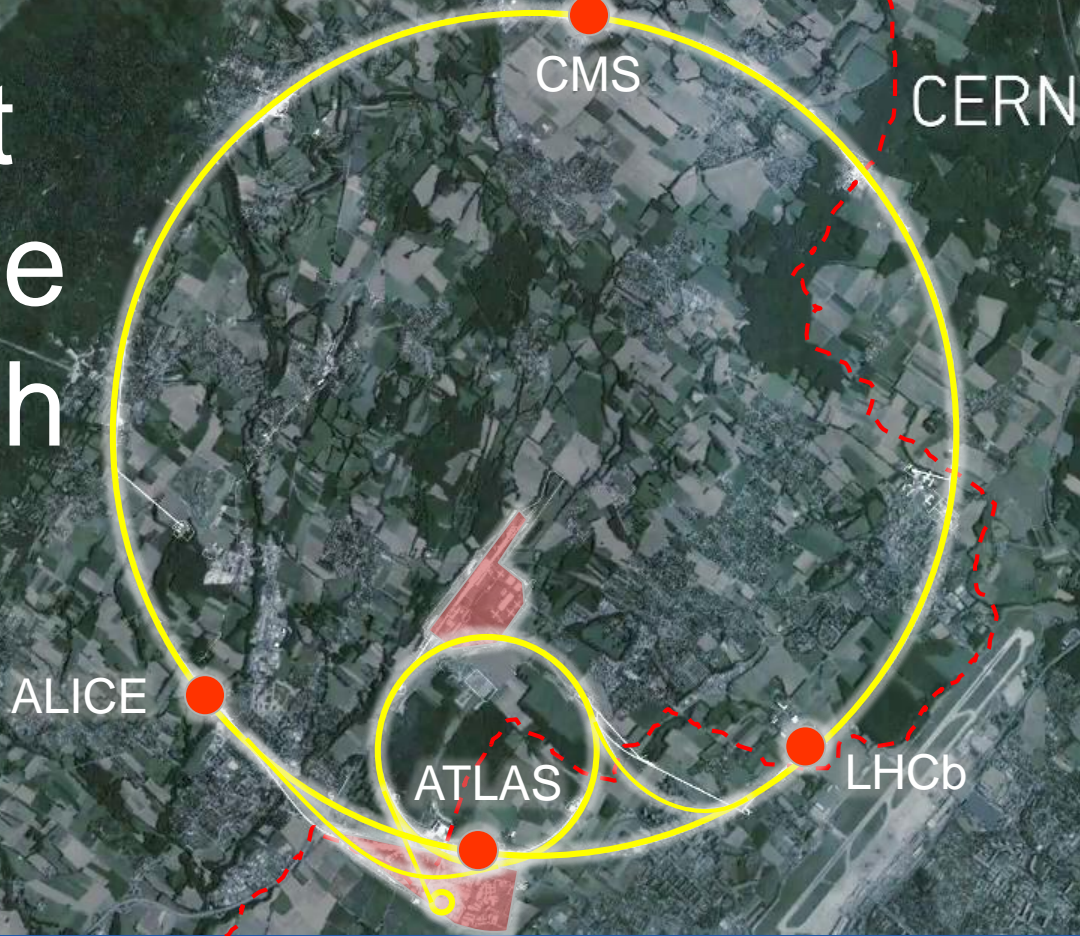


Millions of collisions

A 3D rendering of a particle accelerator tunnel. Two red laser beams enter from the left and right, converging at a central point where they create a bright yellow spark, representing a collision. The tunnel is composed of various cylindrical and conical components, all rendered in a semi-transparent blue color. The background is a dark blue gradient.

25 ns bunch crossing
25 ns entre les paquets

Largest machine on Earth





The most
powerful
magnets

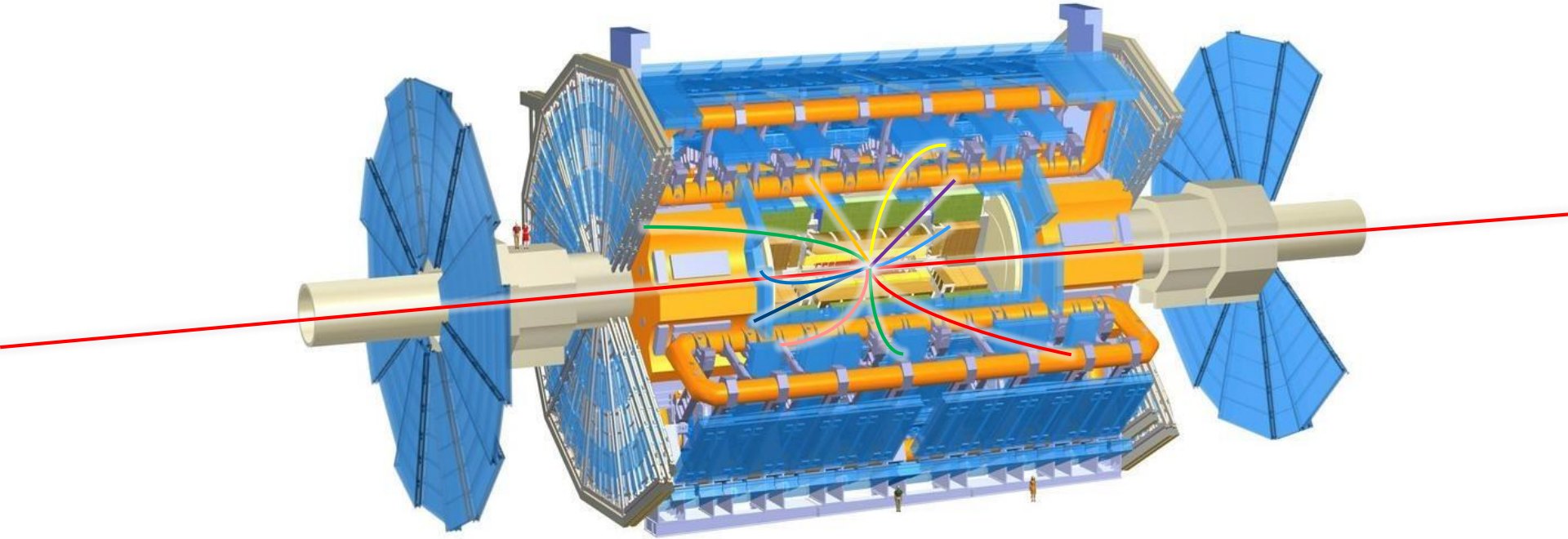


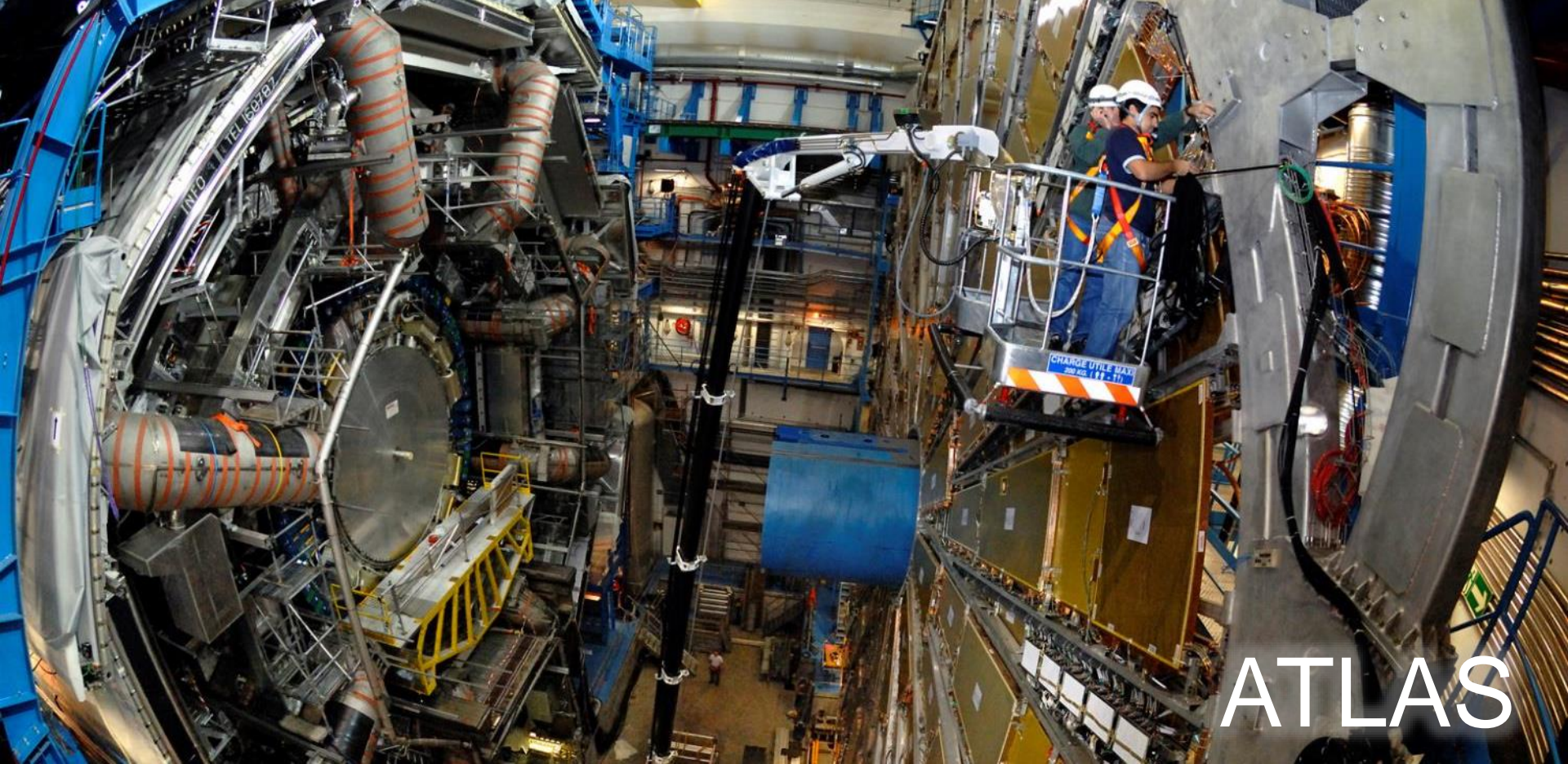
The highest vacuum



The coldest temperature

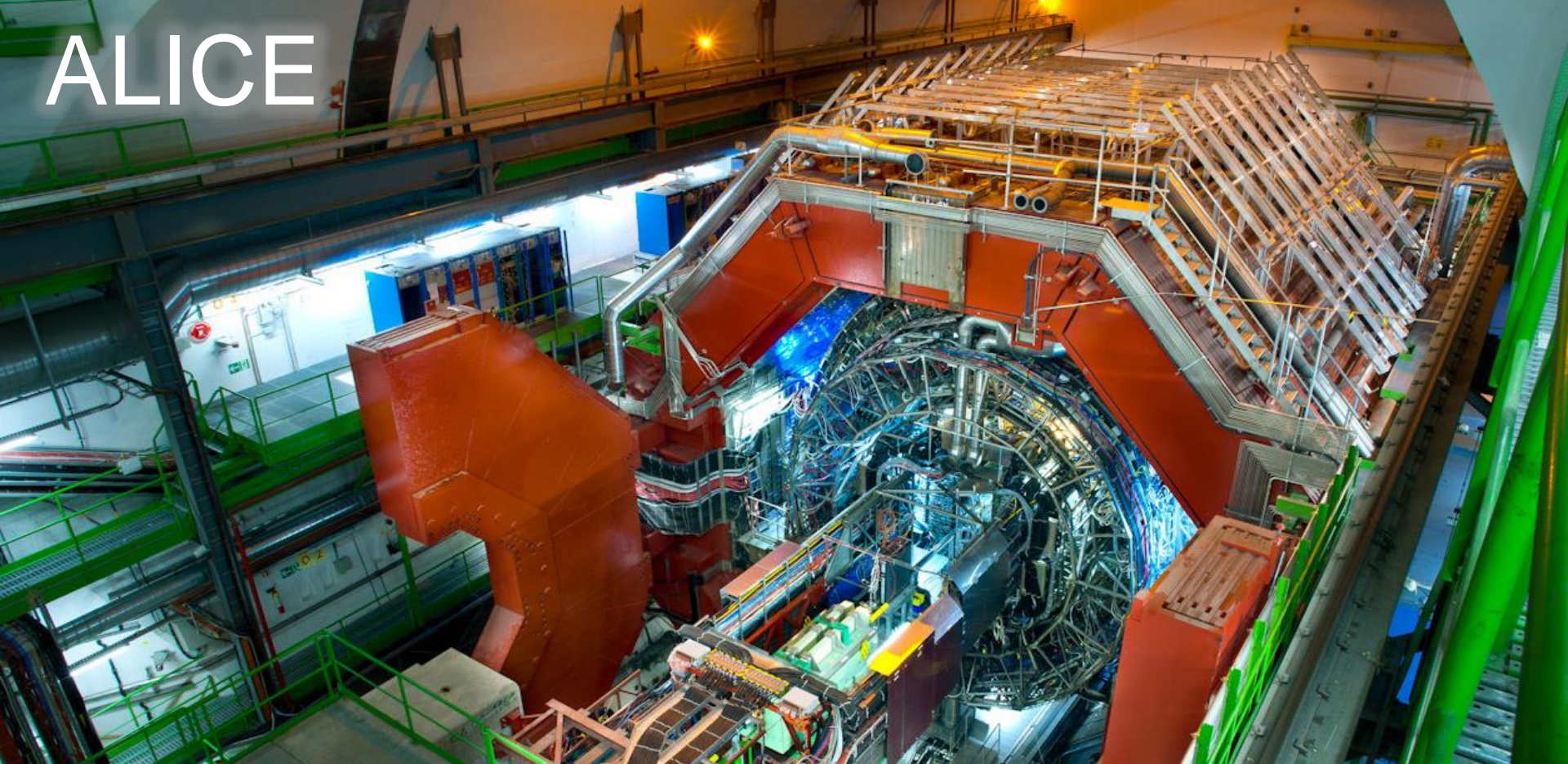
The largest detectors



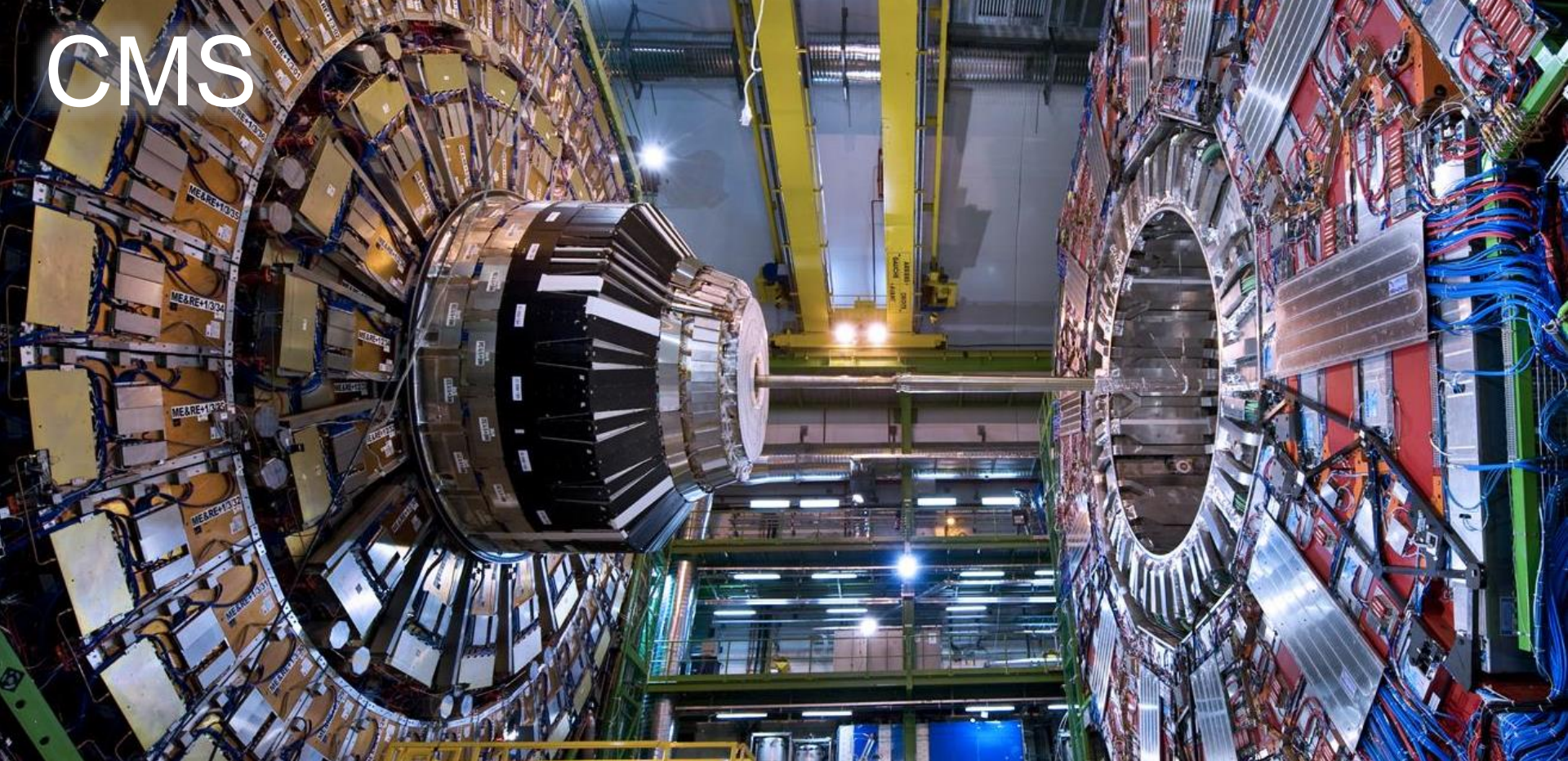


ATLAS

ALICE



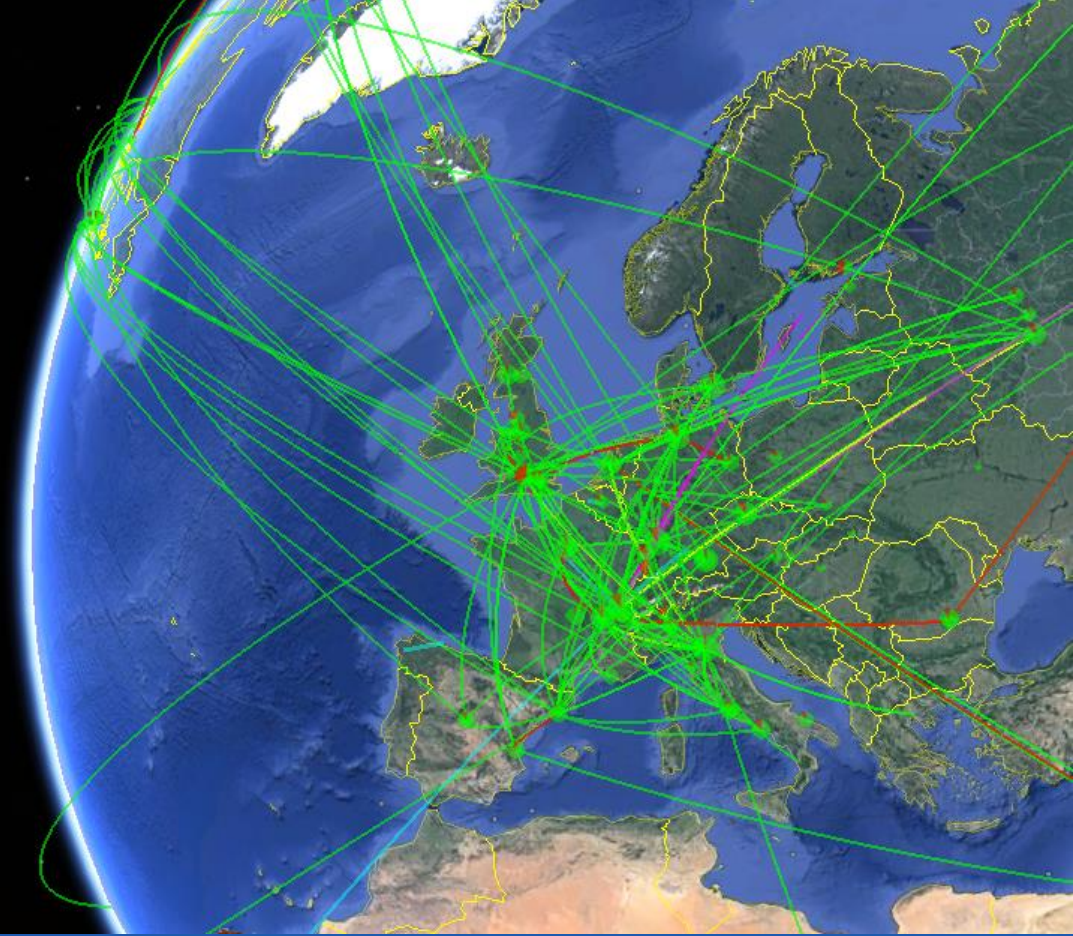
CMS





LHCb

The largest computing grid



CERN

So what ?

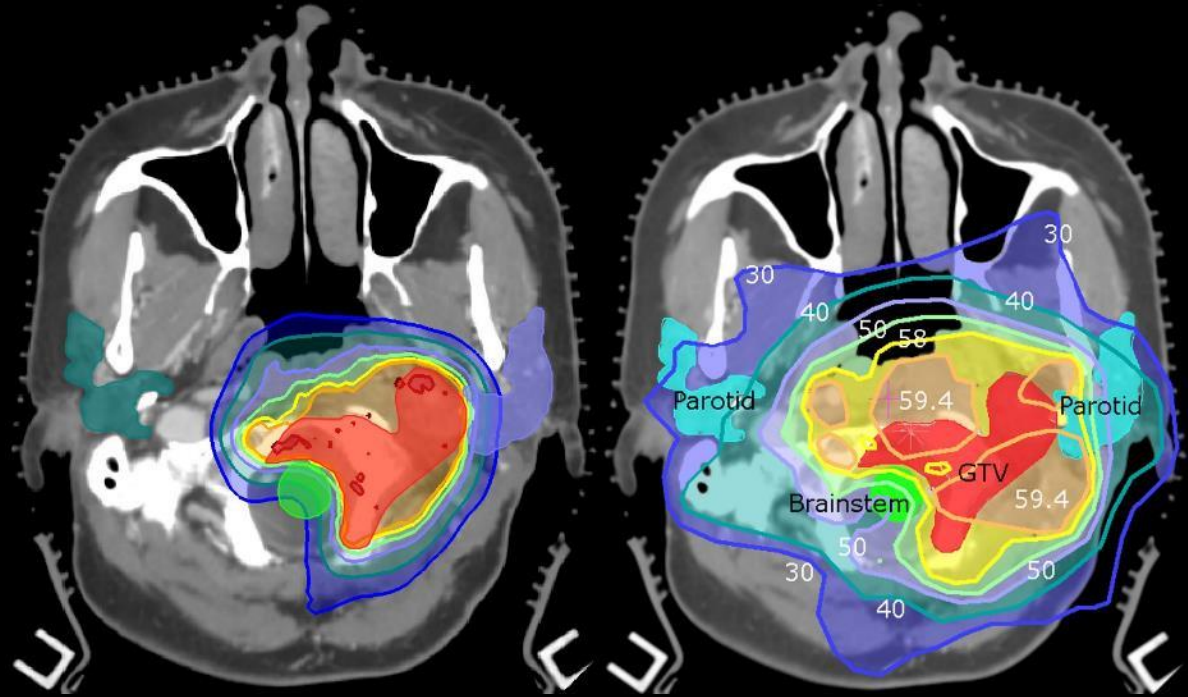


World Wide Web

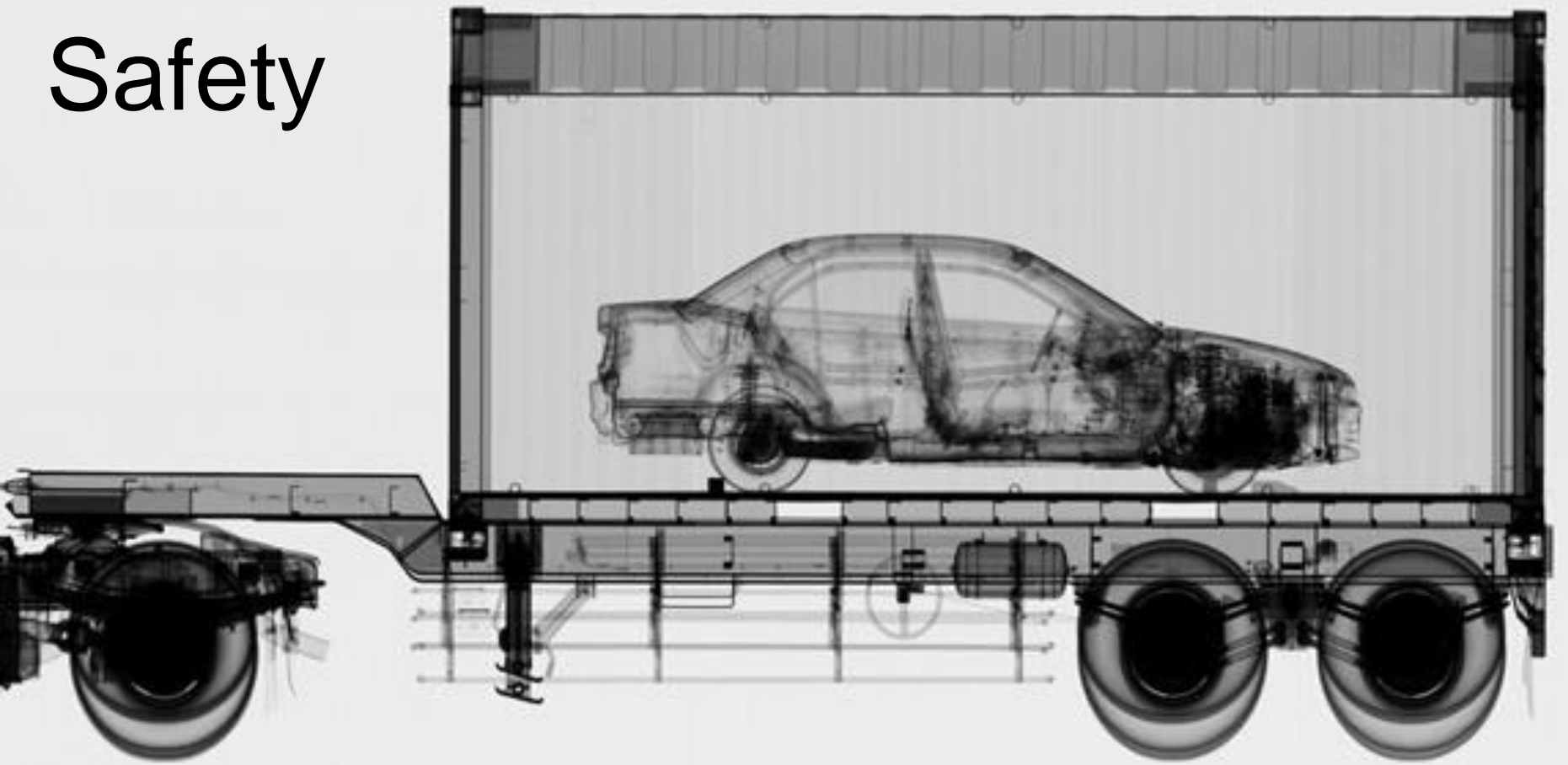
WWW



Medical applications



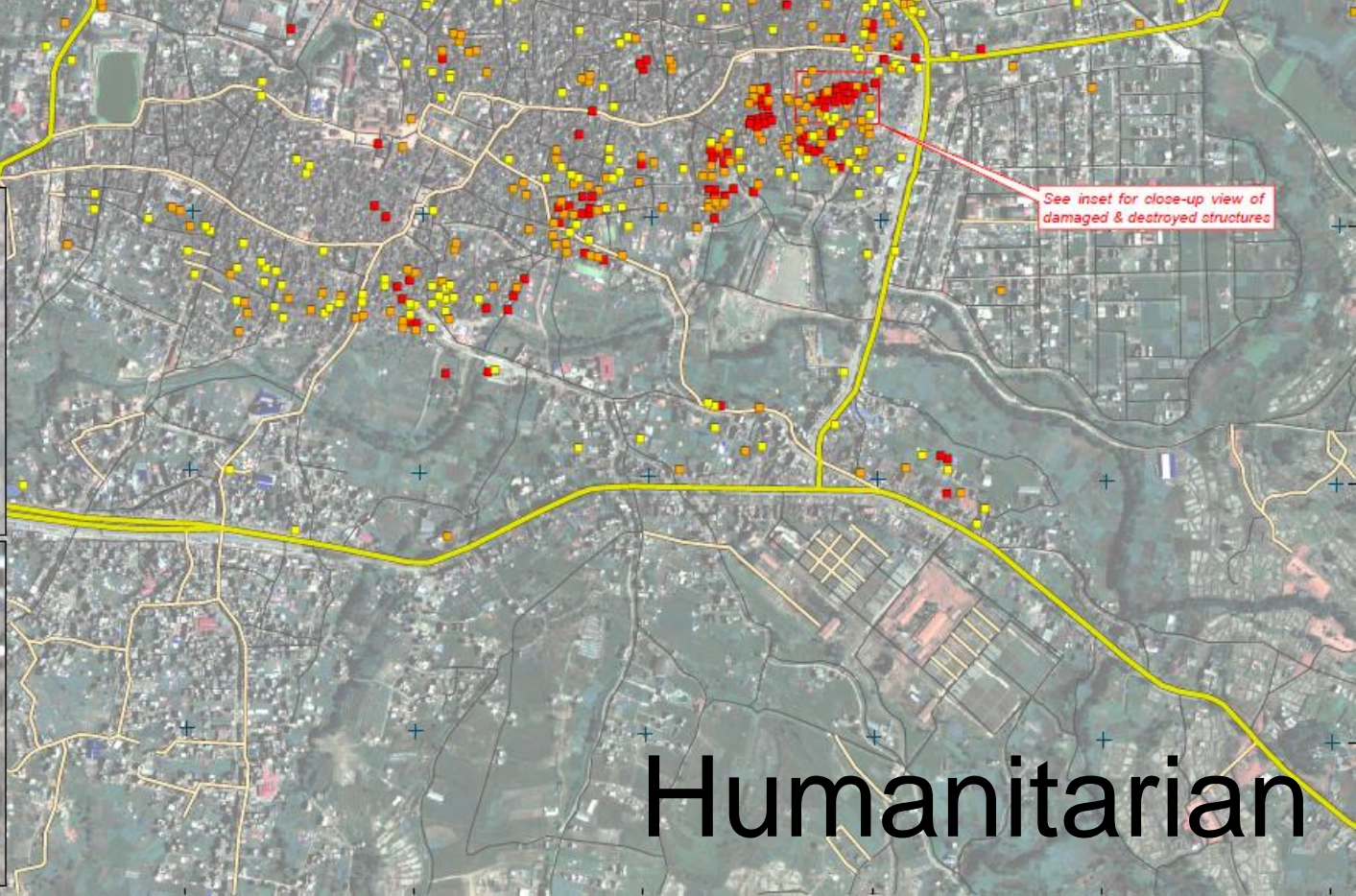
Safety



INSET: PRE-CRISIS



INSET: 27 APRIL 2015



Humanitarian

Some links...

Information : www.cern.ch

CERN TV : youtube.com/cern

Recruitment : www.cern.ch/jobs



In a nutshell...



« Magic is not happening at CERN,
magic is being explained
at CERN. »

Tom Hanks

Presentation
available on
www.cern.ch/briard





www.cern.ch