February 10th, 2011

CC-IN2P3: A High Performance Data Center for Research

LHCOPN meeting in Lyon

Dominique Boutigny

CC-IN2P3 in the French scientific framework

Main scientific organization in France

IN2P3
Institut National de Physique Nucléaire et de Physique des Particules

National Institute for Nuclear Physics and Particle Physics

CC-IN2P3 federates the main computing resources
For :
- **High energy physics**
- **Nuclear physics**
- **Astroparticle physics**

Dedicated Computing Center

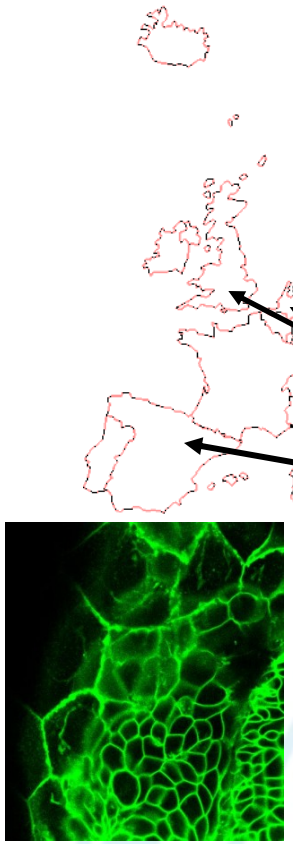
+ some opening to other sciences

DSM cea Irfu — Atomic Energy Commission

Manpower: 85 people
Budget 2010: 10.8 M€ with salaries

A diversity of scientific applications

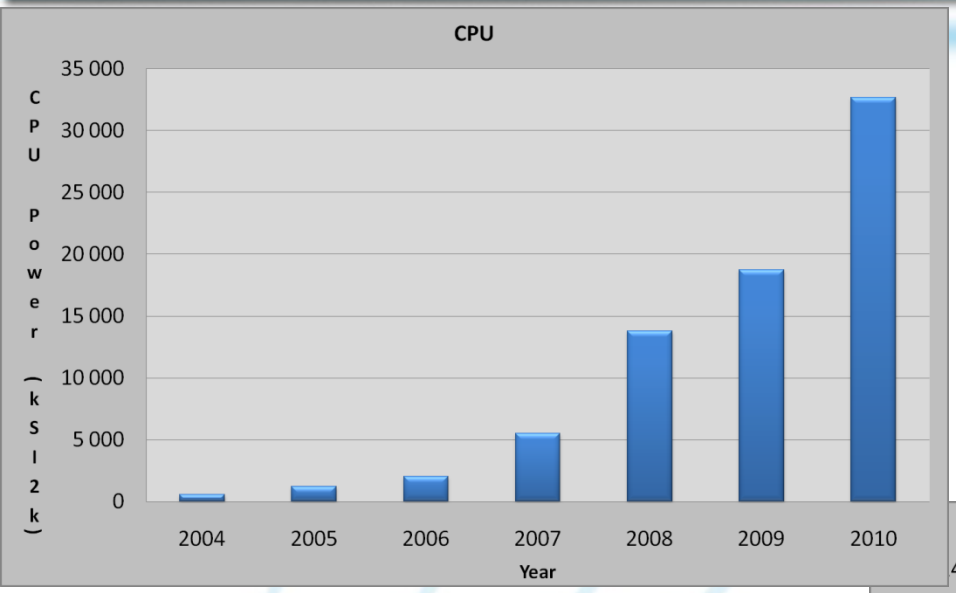
CC-IN2P3 is part of a worldwide network of datacenters for High Energy Physics








CC-IN2P3 current status



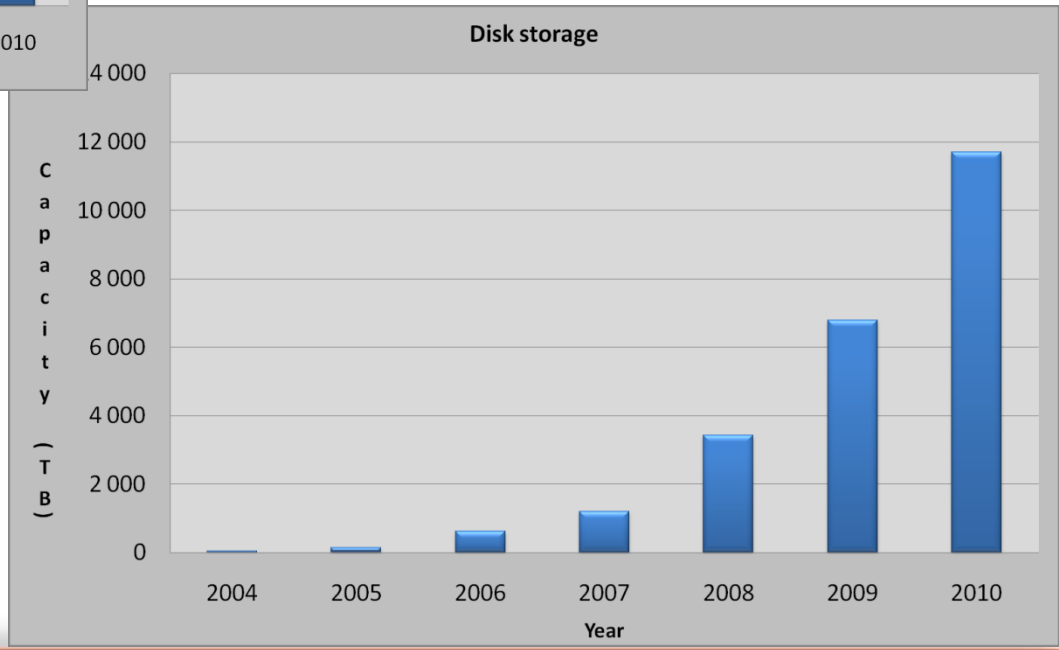
Today, computing power at CC-IN2P3 is dominated by LHC

But several other experiments (~40) rely on CC-IN2P3 for their computing

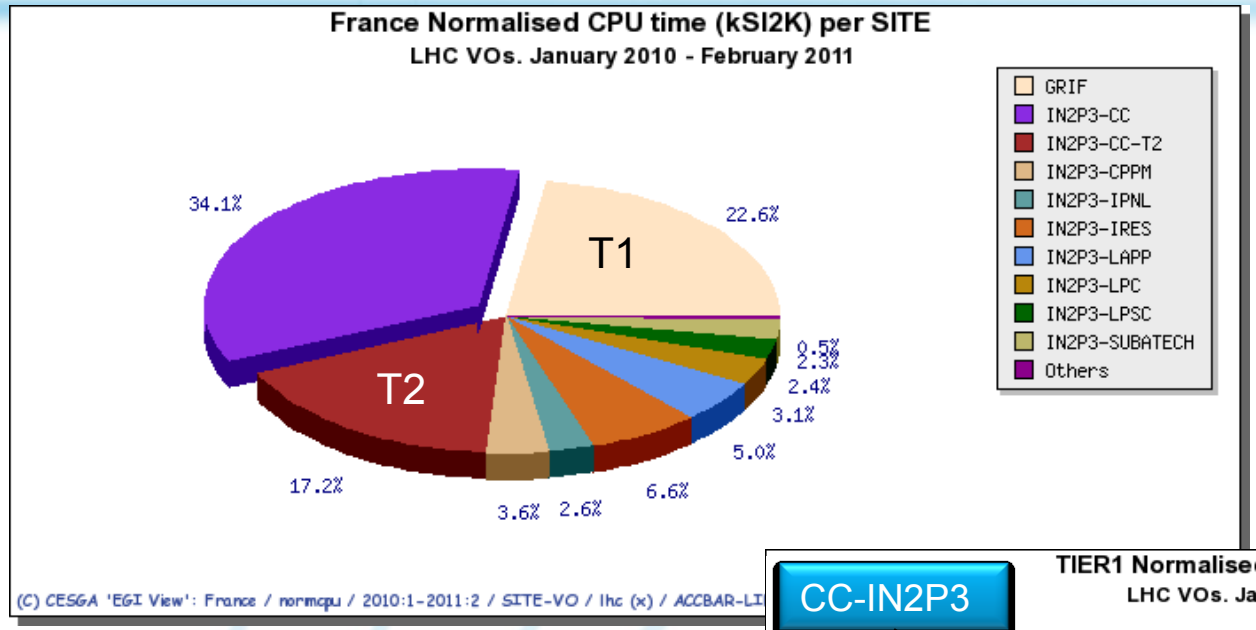
12 000 cores

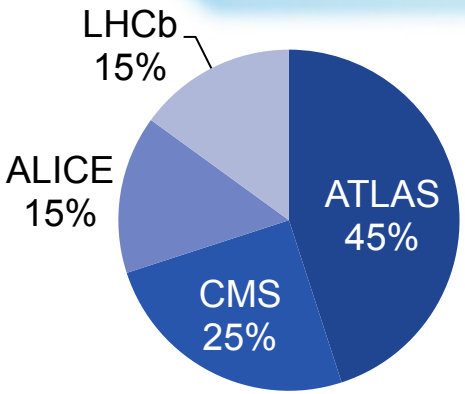
10 PB of disk storage

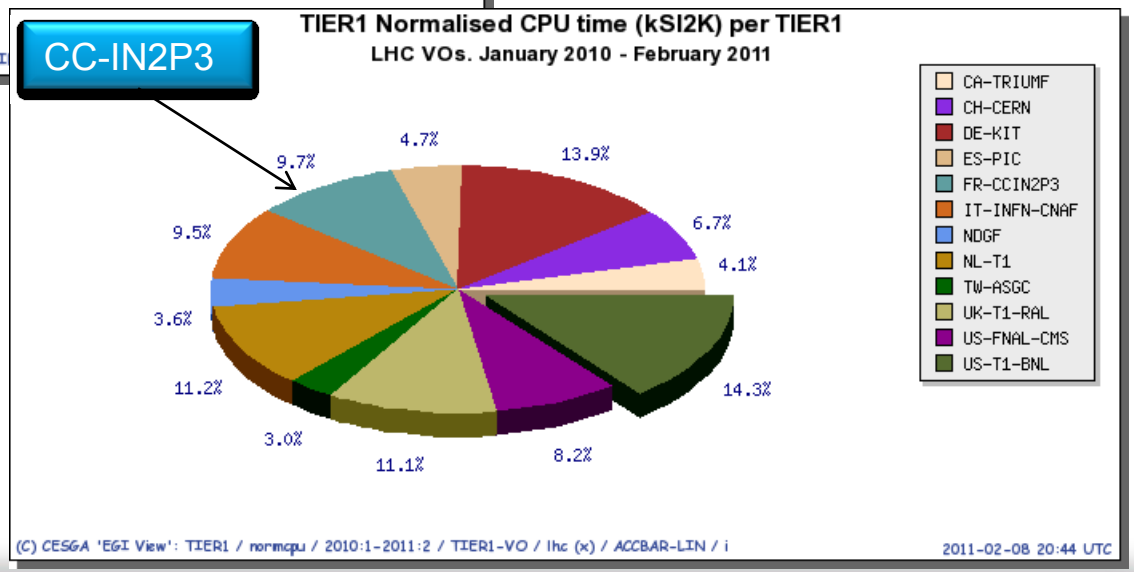
4 robotic silos (up to 40 Pbytes capacity)



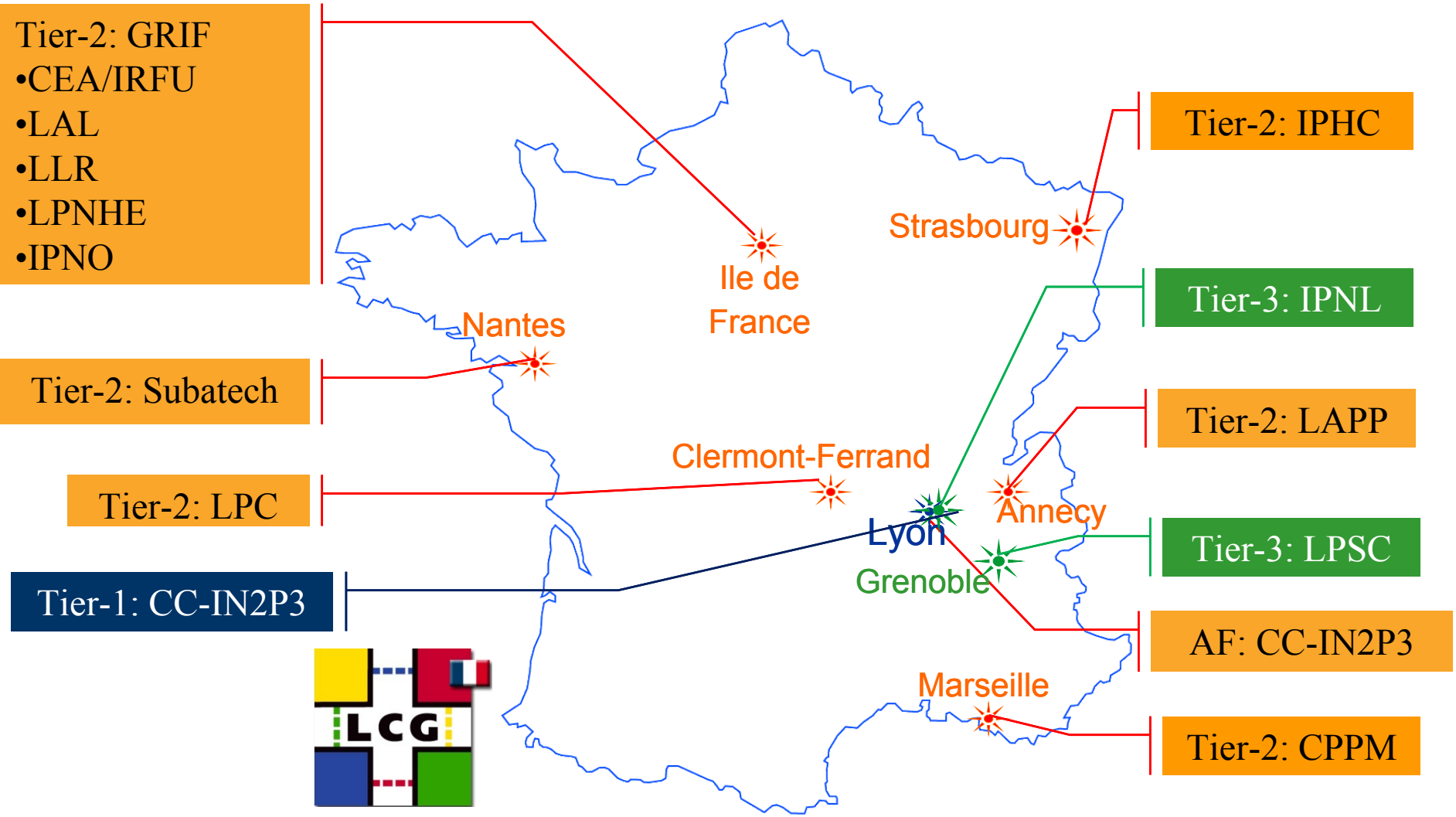
LCG @ CC-IN2P3


France Normalised CPU time (kSI2K) per SITE
LHC VOs. January 2010 - February 2011
GRIF
IN2P3-CC
IN2P3-CC-T2
IN2P3-CPPM
IN2P3-IPNL
IN2P3-IRES
IN2P3-LAPP
IN2P3-LPC
IN2P3-LPSC
IN2P3-SUBATECH
Others
34.1%
22.6%
T1
T2
17.2%
3.6%
2.6%
6.6%
5.0%
3.1%
2.4%
2.3%
0.5%
(C) CESGA 'EGI View': France / normcpu / 2010:1-2011:2 / SITE-VO / lhc (x) / ACCBAR-LI


LHCb
15%
ALICE
15%
ATLAS
45%
CMS
25%


CC-IN2P3
TIER1 Normalised CPU time (kSI2K) per TIER1
LHC VOs. January 2010 - February 2011
CA-TRIUMF
CH-CERN
DE-KIT
ES-PIC
FR-CCIN2P3
IT-INFN-CNAF
NDGF
NL-T1
TW-ASGC
UK-T1-RAL
US-FNAL-CMS
US-T1-BNL
4.7%
13.9%
9.7%
6.7%
9.5%
4.1%
3.6%
11.2%
14.3%
3.0%
11.1%
8.2%
(C) CESGA 'EGI View': TIER1 / normcpu / 2010:1-2011:2 / TIER1-VO / lhc (x) / ACCBAR-LIN / i
2011-02-08 20:44 UTC

The French LCG sites



Sept.10

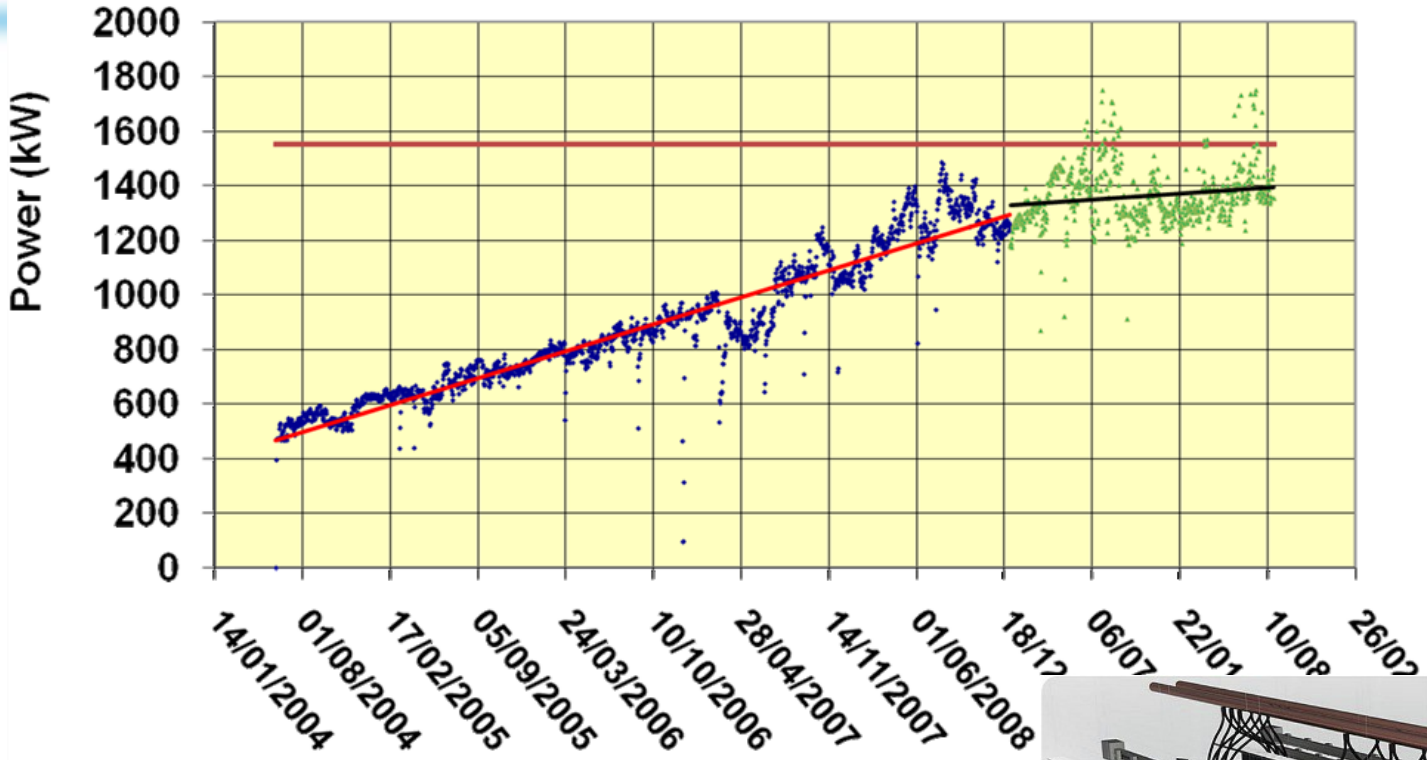
Network is crucial

… for LCG
will become even more crucial with the foreseen evolution of the Tier interconnection

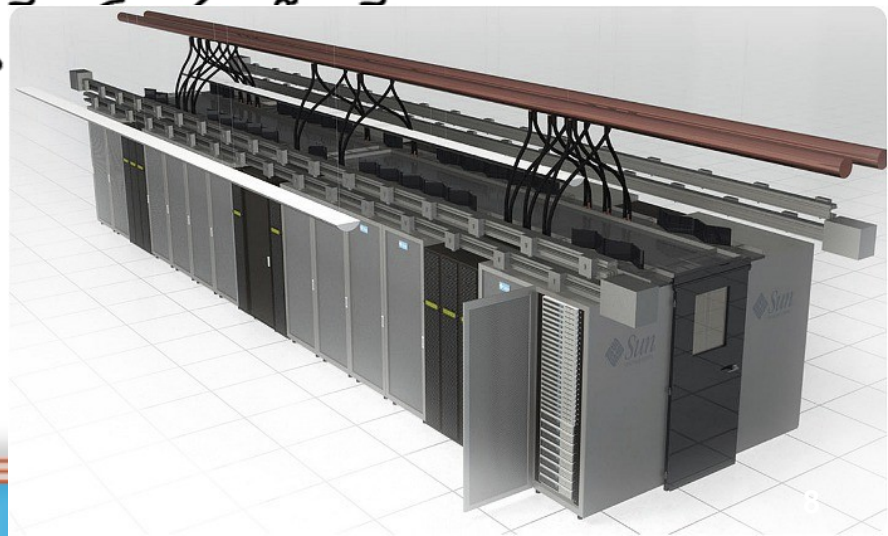
but also for all the other projects supported at CC-IN2P3

Strong relationships with Asia : China – Japan - Korea

Infrastructure evolution



The very fast increase of the computing equipments installed at CC-IN2P3 creates a huge load on the infrastructure



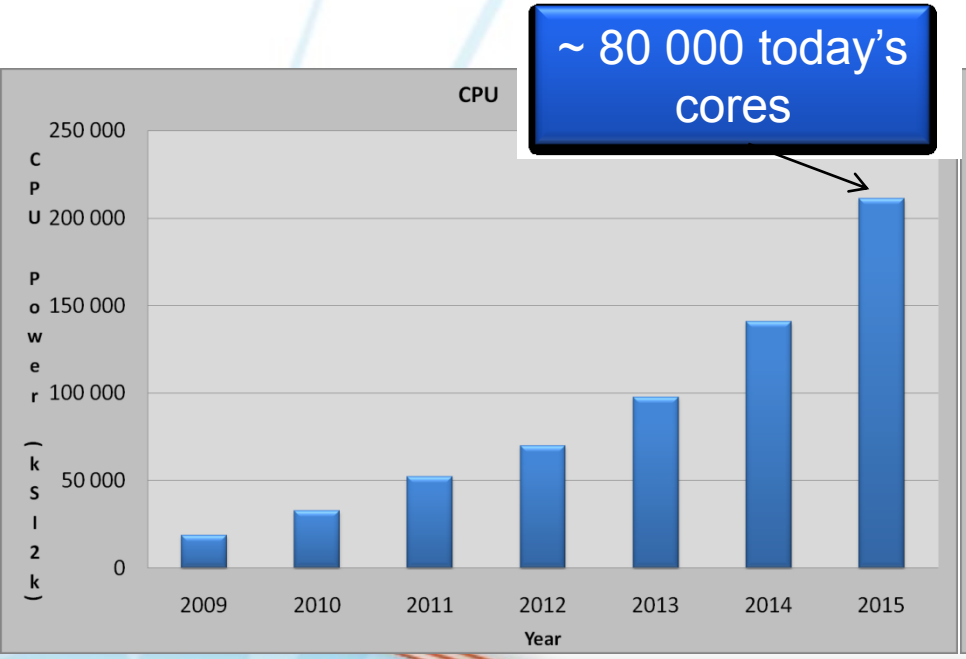
The infrastructure pushed to the limits

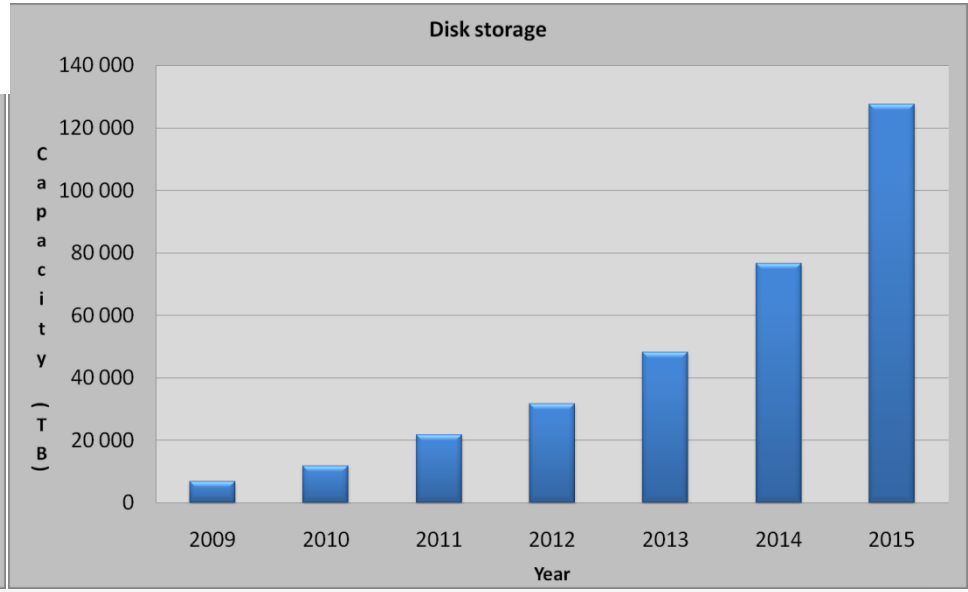
A lot of money invested since 6 years
But not enough to fulfill our long term scientific commitments

➔ Build a new datacenter

The design parameters used to define the size of the new datacenter has been the following:

- Serve ~40 experiments with "standards needs"
- Fulfill LHC computing commitments and provide first class analysis capability
- **Expect a very significant growth of the Astroparticle community needs: LSST, EUCLID)**
- Add some capacity for network, services, etc.





New datacenter

- Assume Moore law is still valid
- Extrapolate up to 2019

End up with:

indicated power is for computing only
power for cooling has to be added

2011	2015	2019
50 racks	125 racks	216 racks
600 kW	1.5 MW	3.2 MW

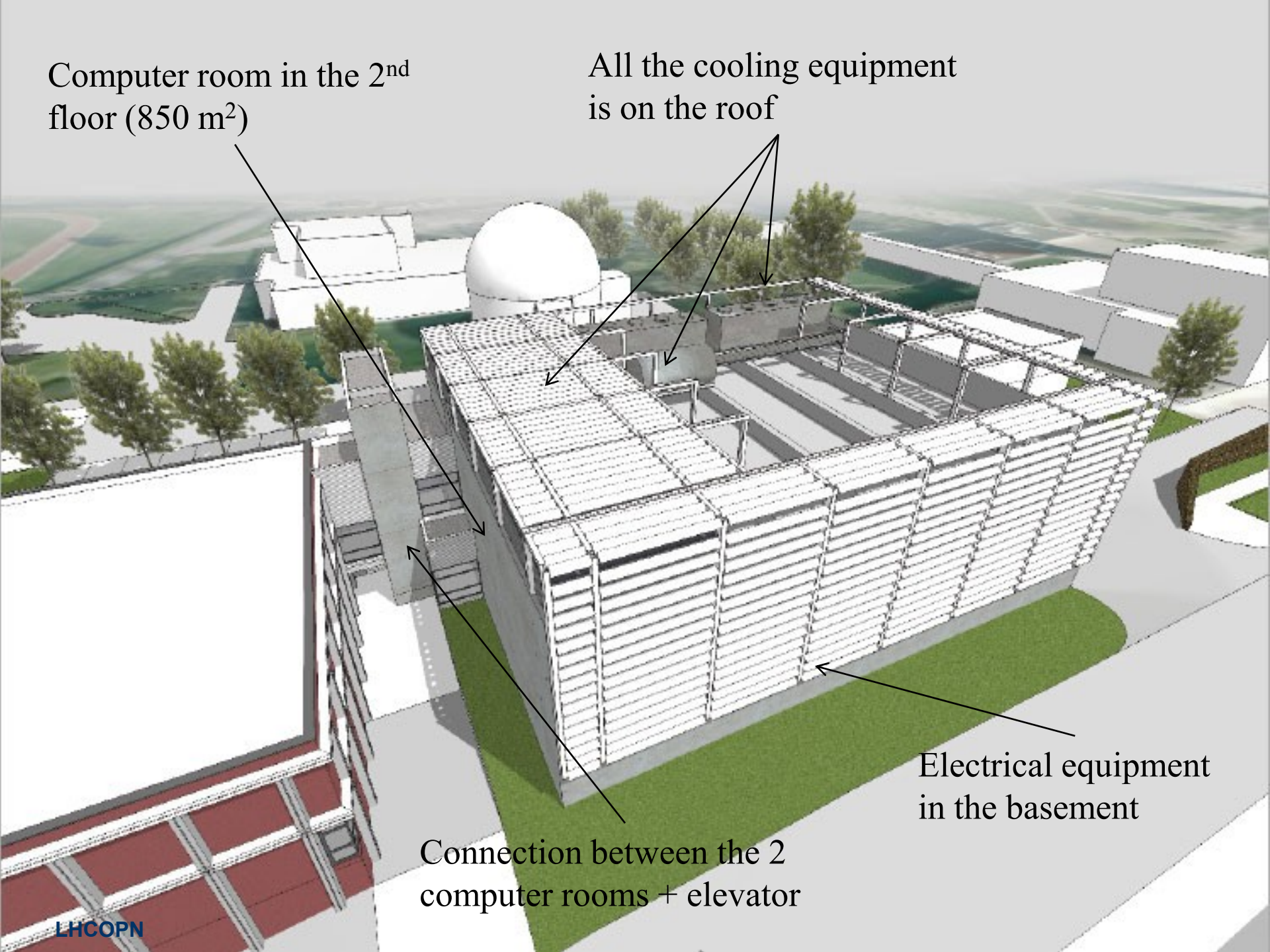
On top of the existing computer room (1 MW)

Due to budget constraints the new computer room will start with a limited power (600 kW)
➔ Modular design – Easily scalable

Chilled water and electricity distribution has been designed for the 2019 target value

Equipment: transformers, chillers, UPS etc… will be added later

The new datacenter


Computer room in the 2nd floor (850 m2)
All the cooling equipment is on the roof
Electrical equipment in the basement
Connection between the 2 computer rooms + elevator

- The new computer room will be available by mid March 2011.
- An upgrade plan do exist to bring it to full power by 2019 (4.2 MW total capacity for computing equipment)
- Plenty of room, cooling and power