

Welcome to Nikhef

AARC2 2. All Hands Meeting

David Groep

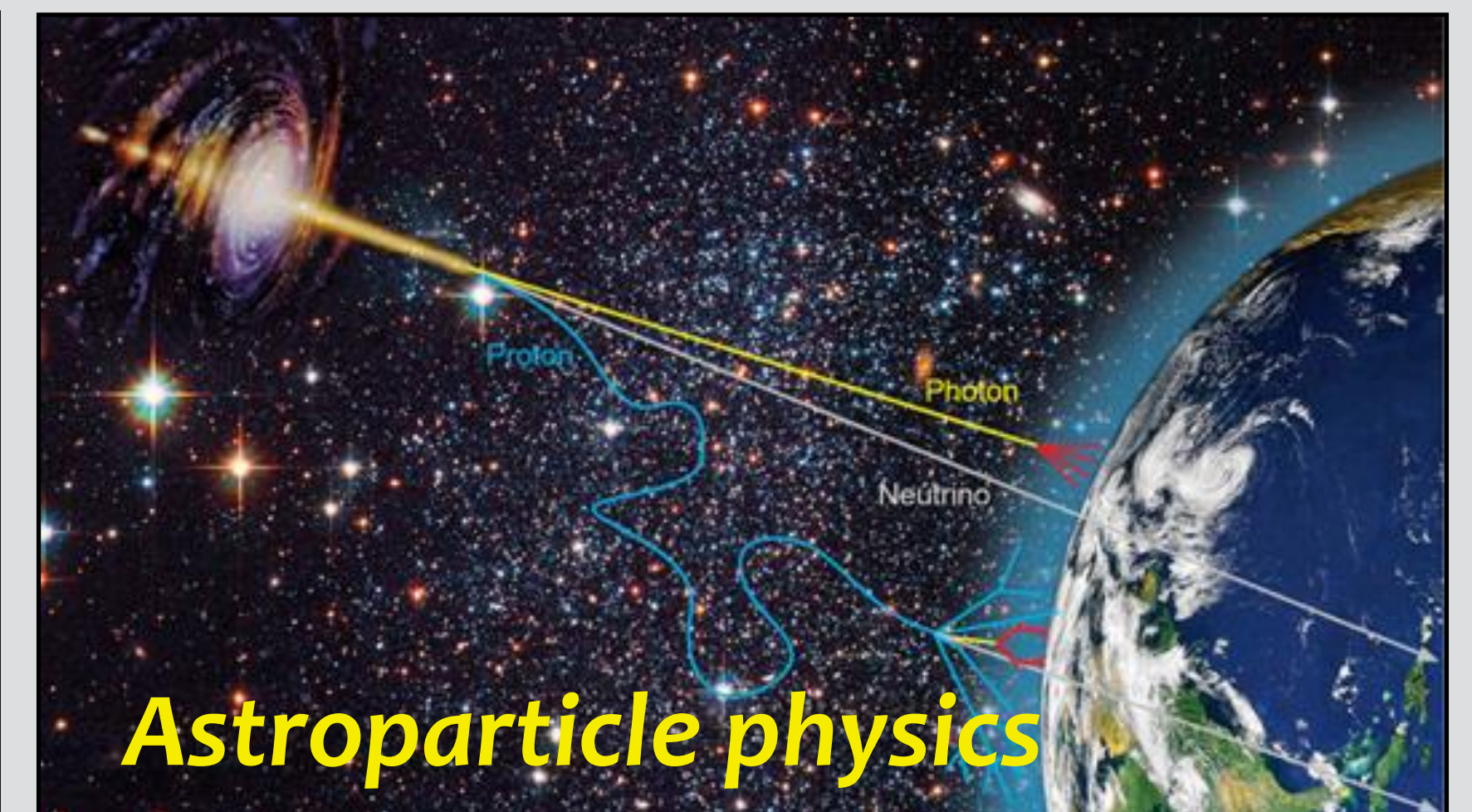
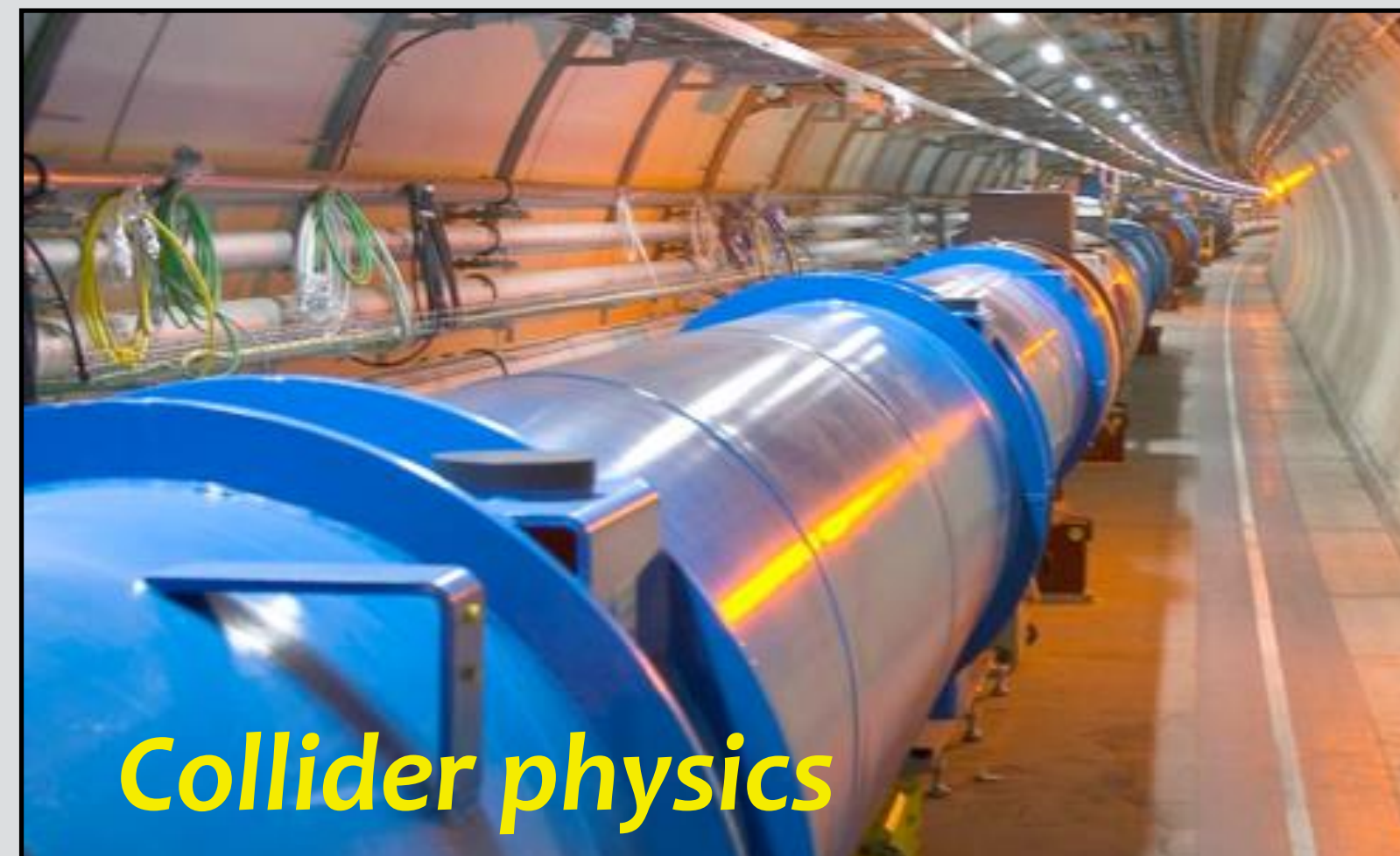
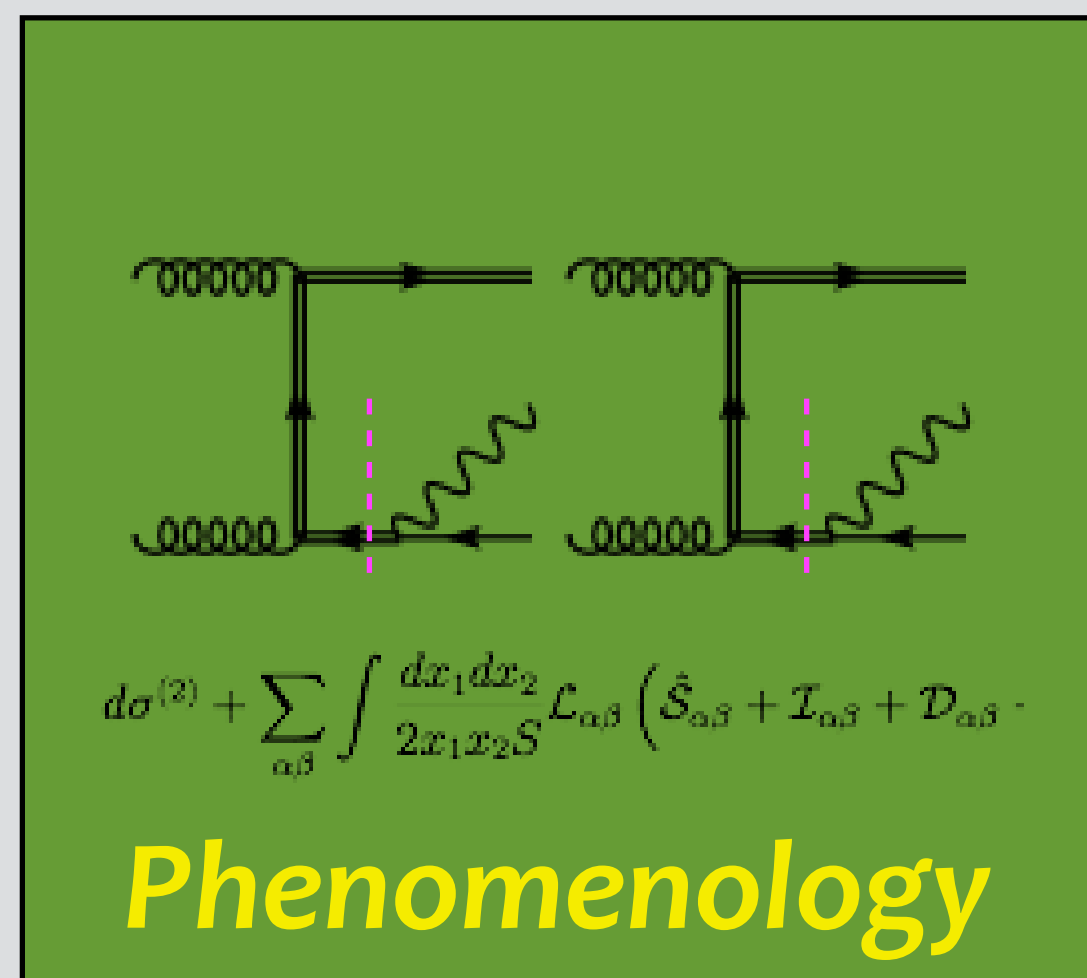


About Nikhef
About the meeting
About dinner

Nikhef

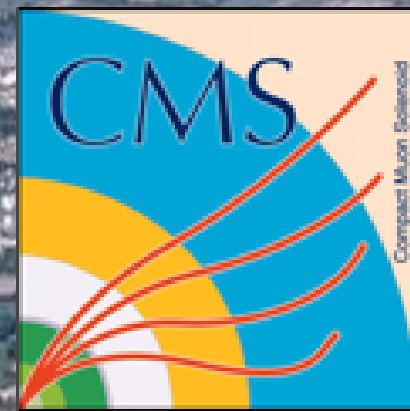
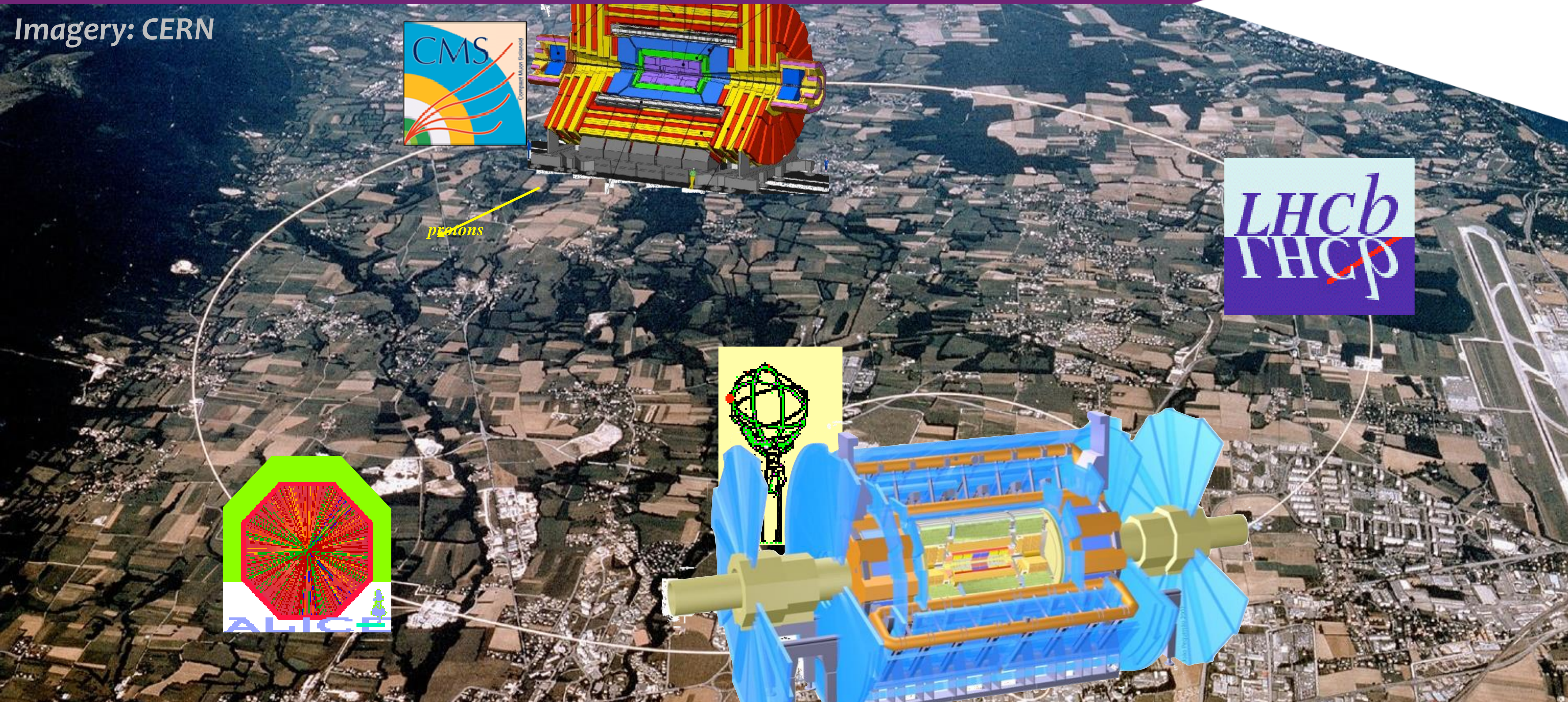
What is Nikhef

- **Accelerator-based particle physics**
Experiments studying interactions in particle collision processes at particle accelerators, in particular at CERN;
- **Astroparticle physics**
Experiments studying interactions of particles and radiation emanating from the Universe.



Large Hadron Collider

Imagery: CERN

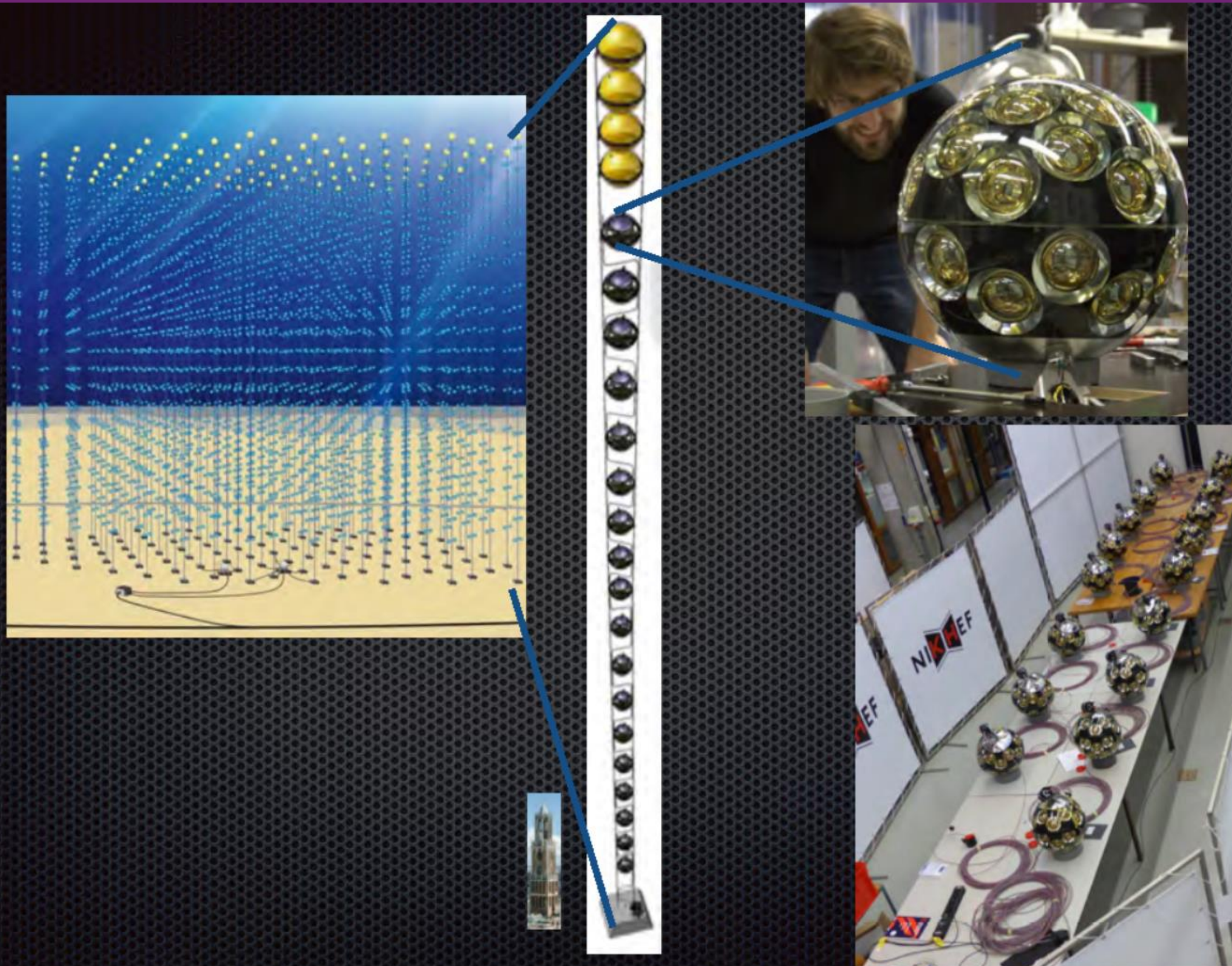


protons



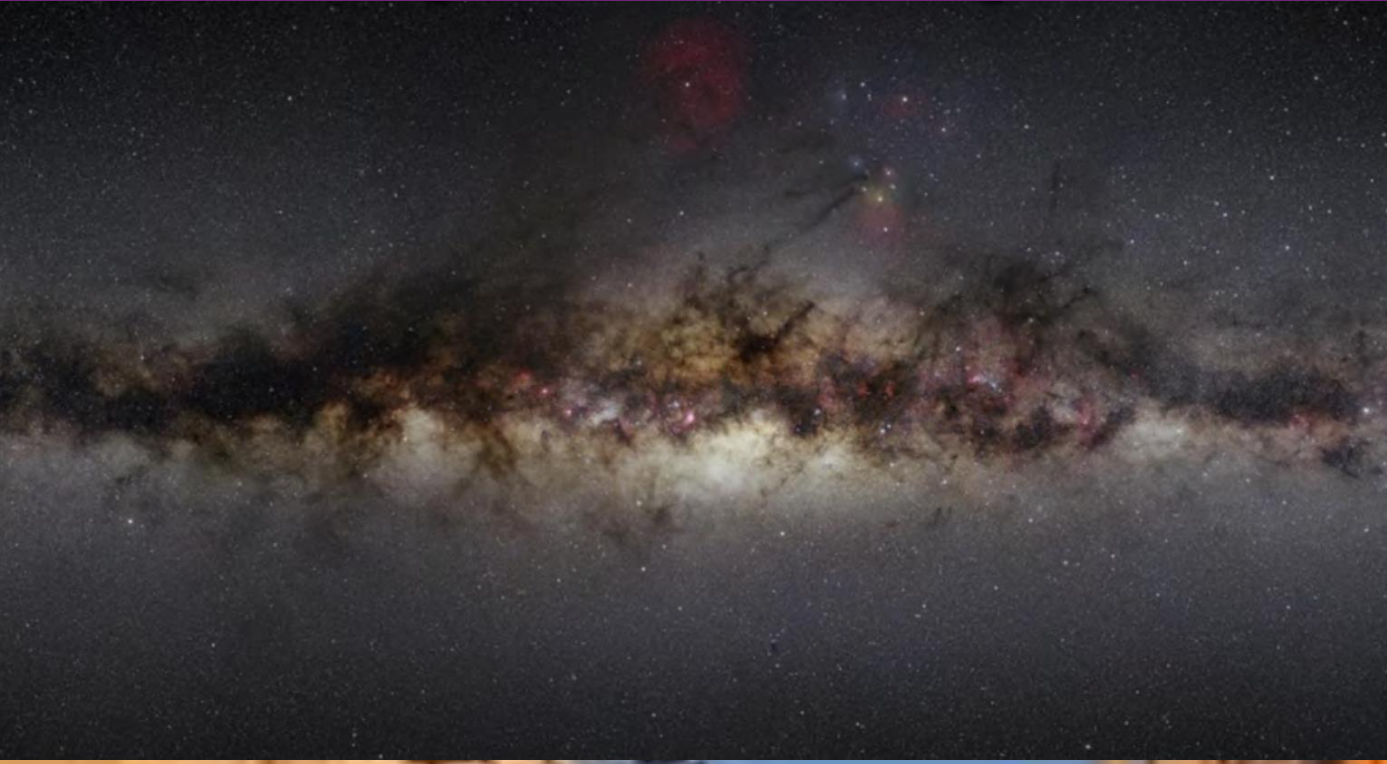
Nikhef participates in the Atlas, LHCb, and Alice experiments

Neutrinos at Nikhef: KM3Net

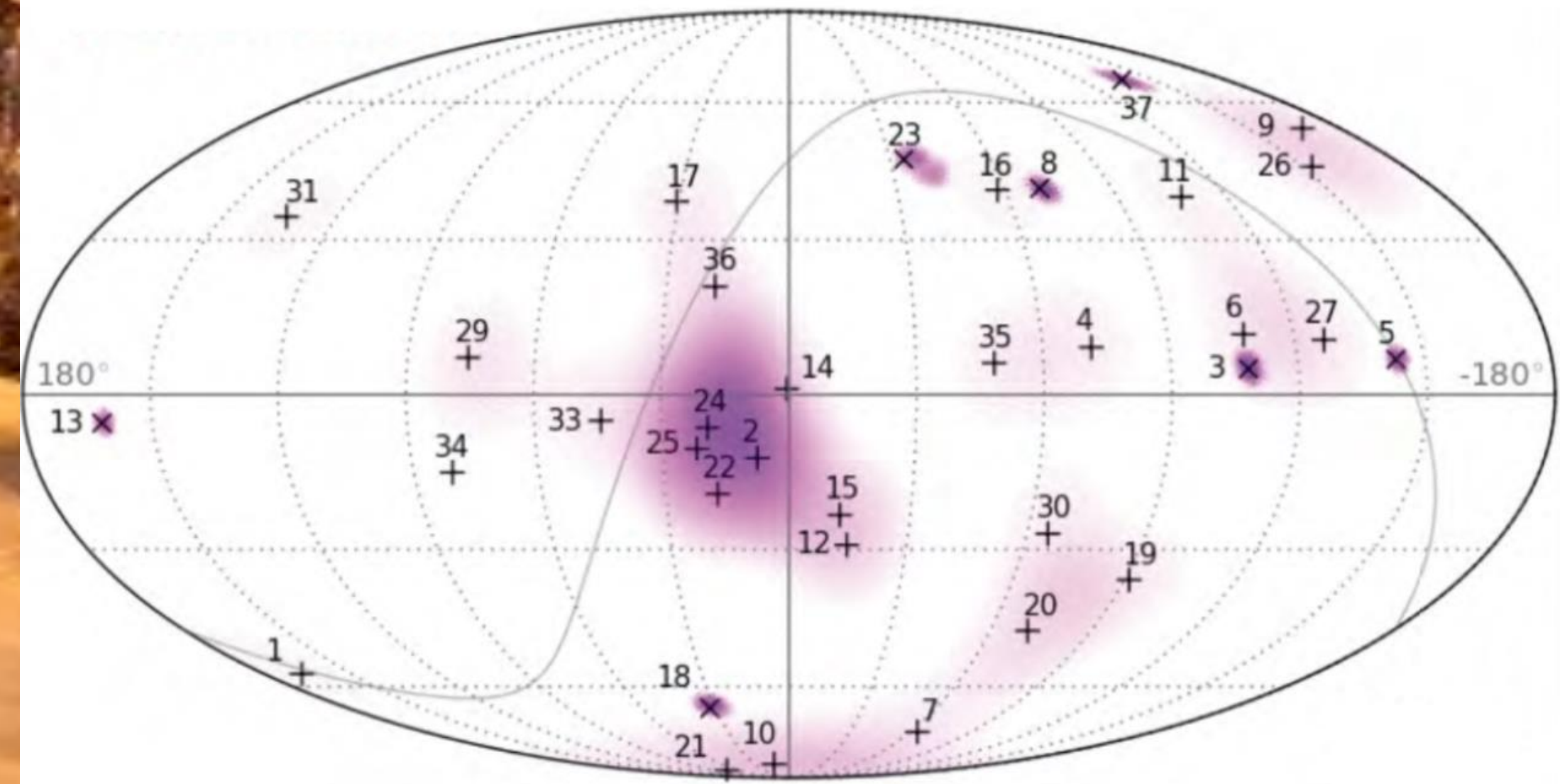


Nikhef participates in the Atlas, LHCb, and Alice experiments

Neutrino at nikhef: KM3Net

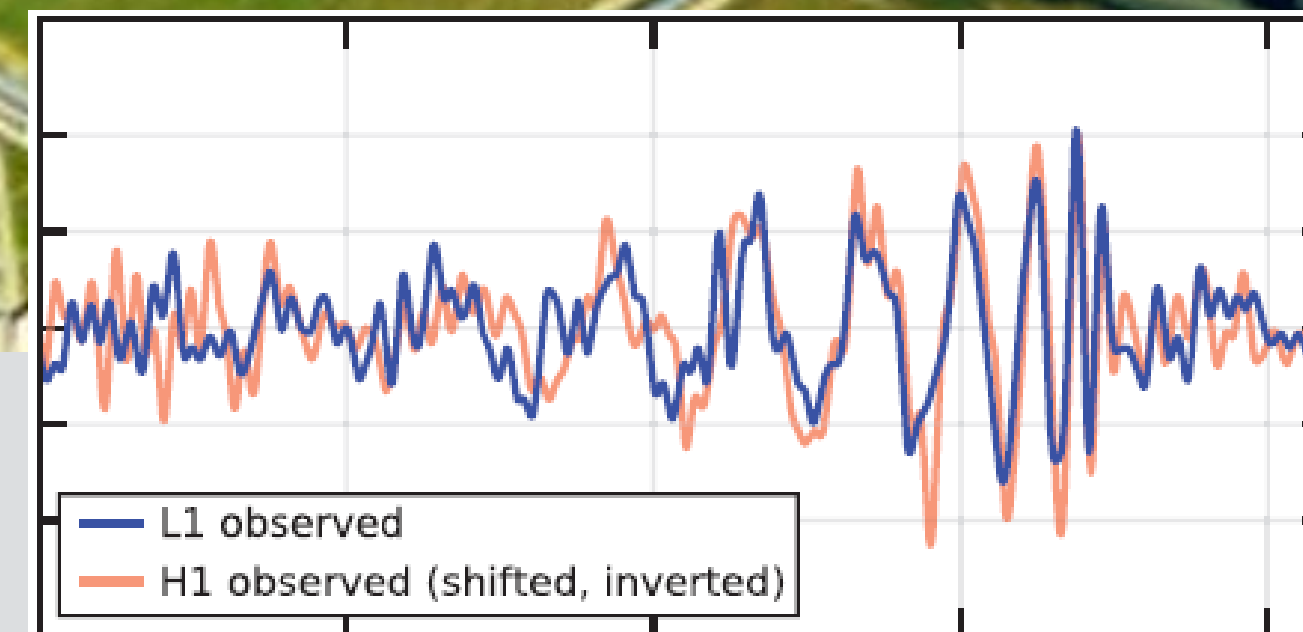
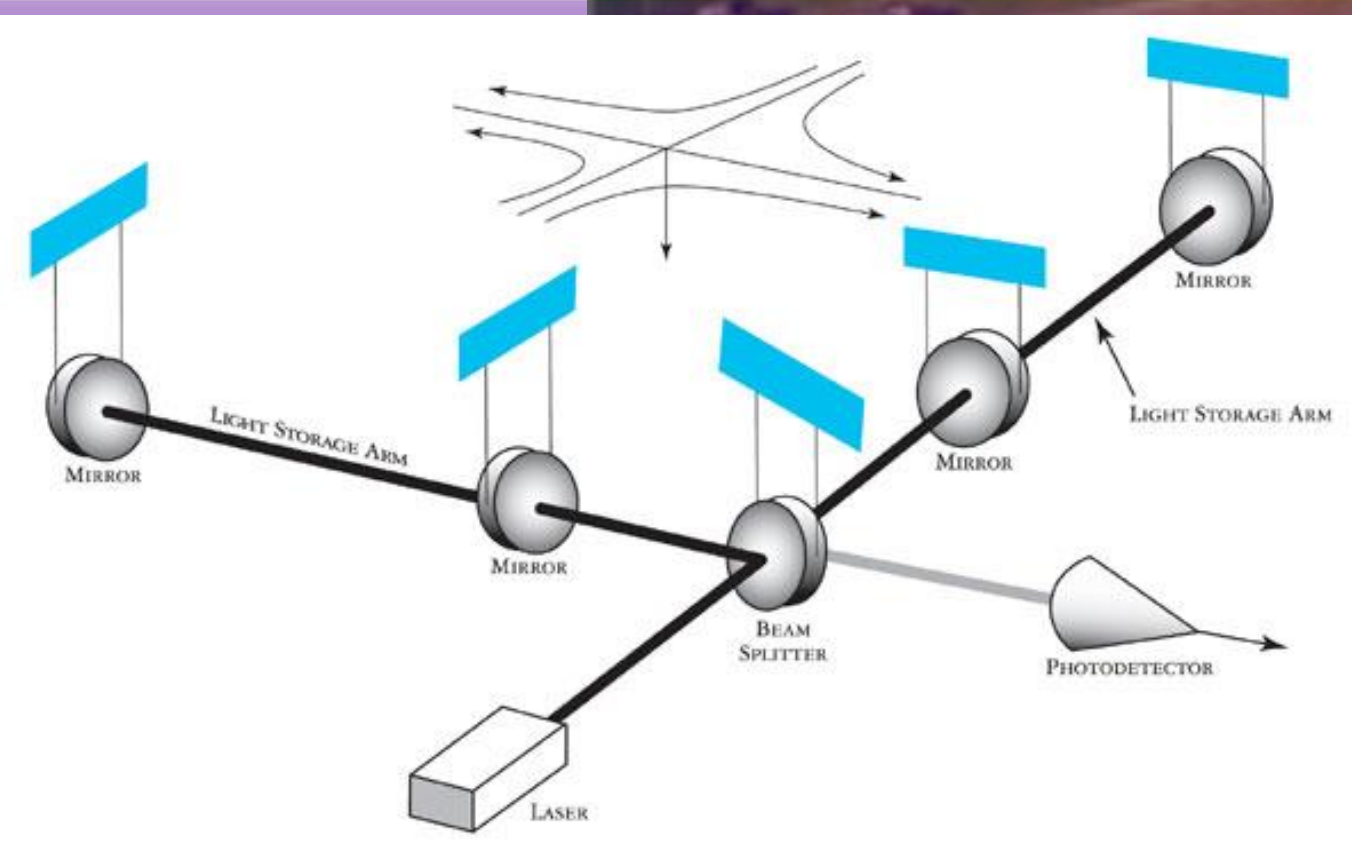


De Melkweg met neutrino's



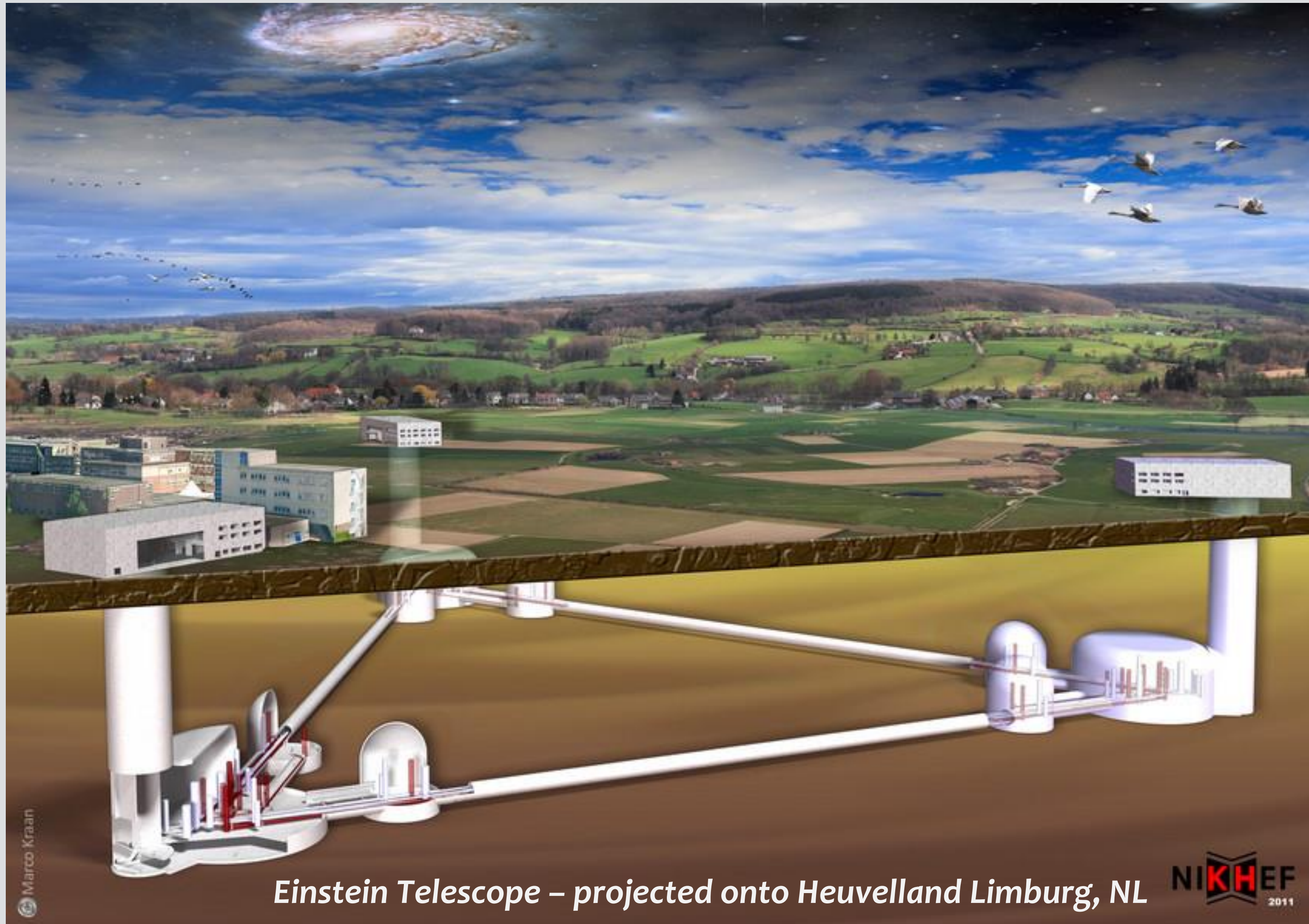
Nikhef participates in the Atlas, LHCb, and Alice experiments

Virgo & LIGO GW astronomy



Imagery: gw-astronomy collaborations, LSC

GW Astronomy: ET



Astroparticle Physics

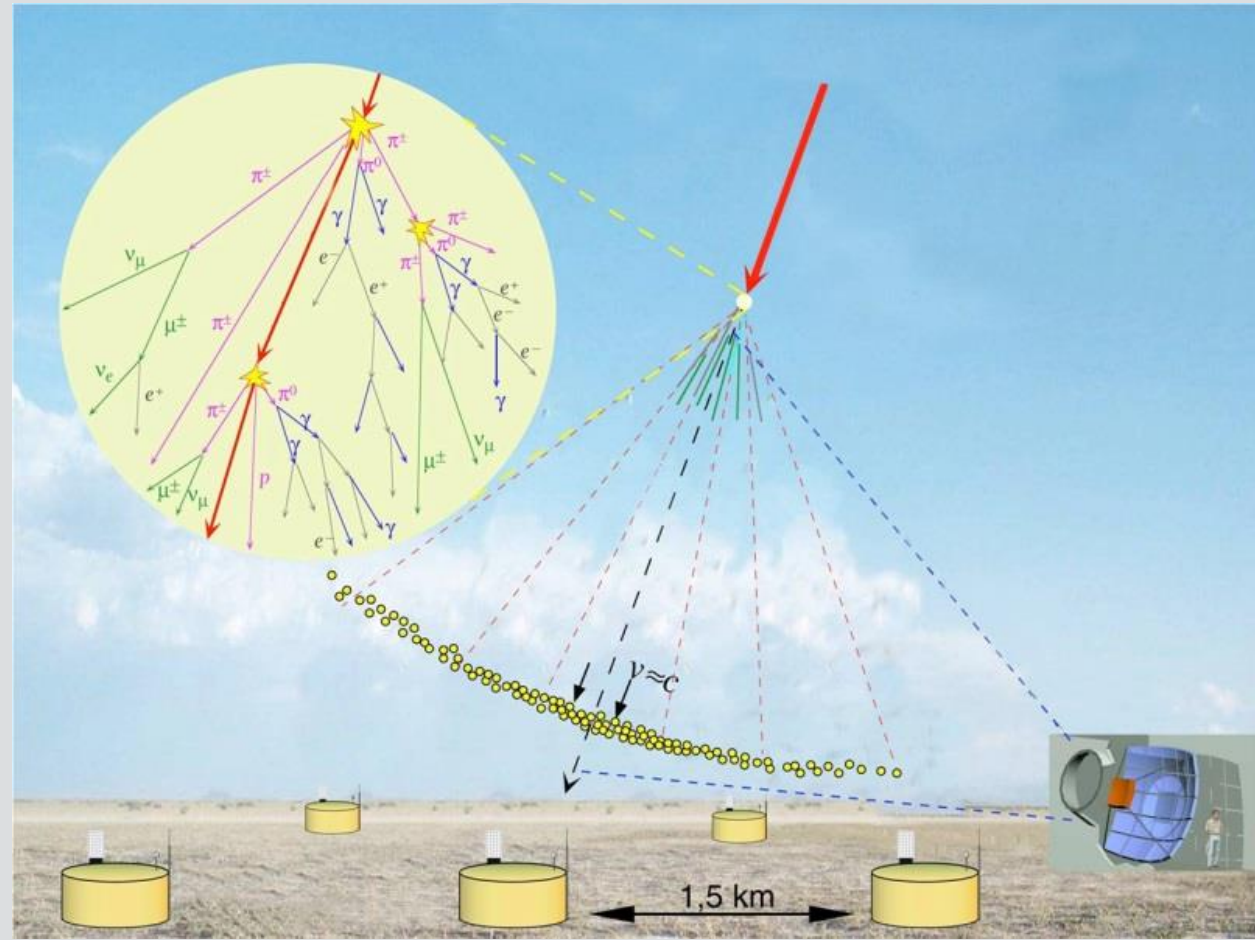
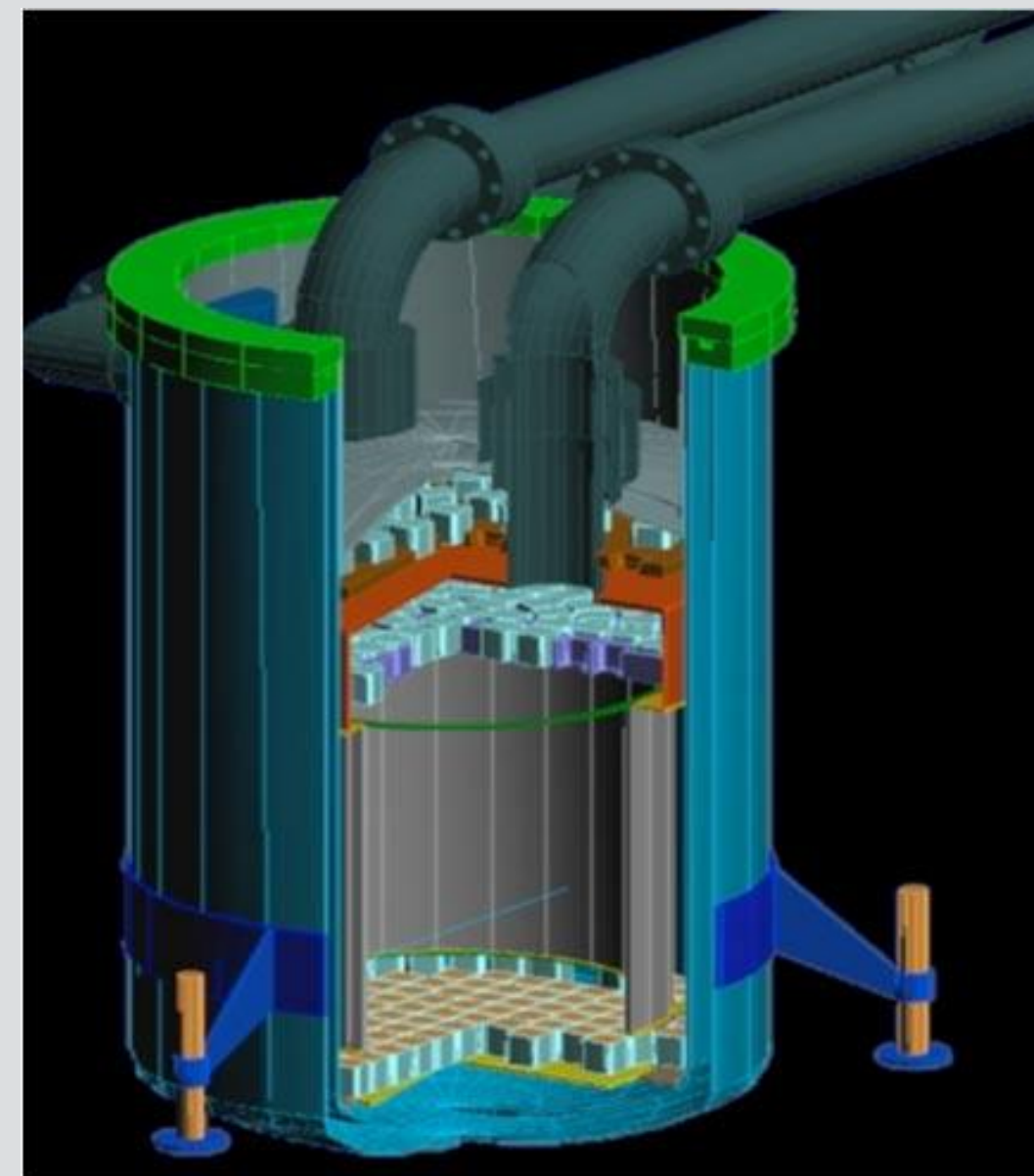
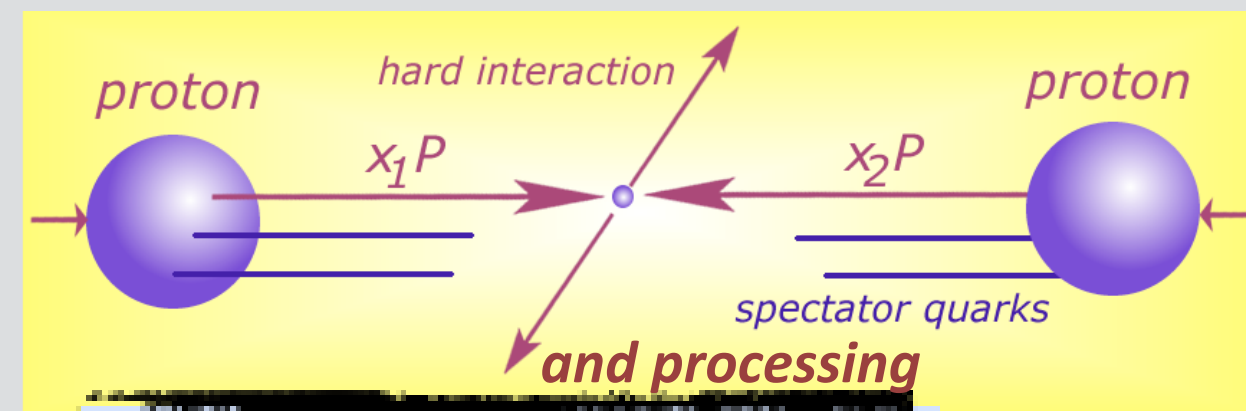


Image sources:
LNGS/INFN,
Xenon collaboration;
Pierre Auger collaboratio
Nikhef

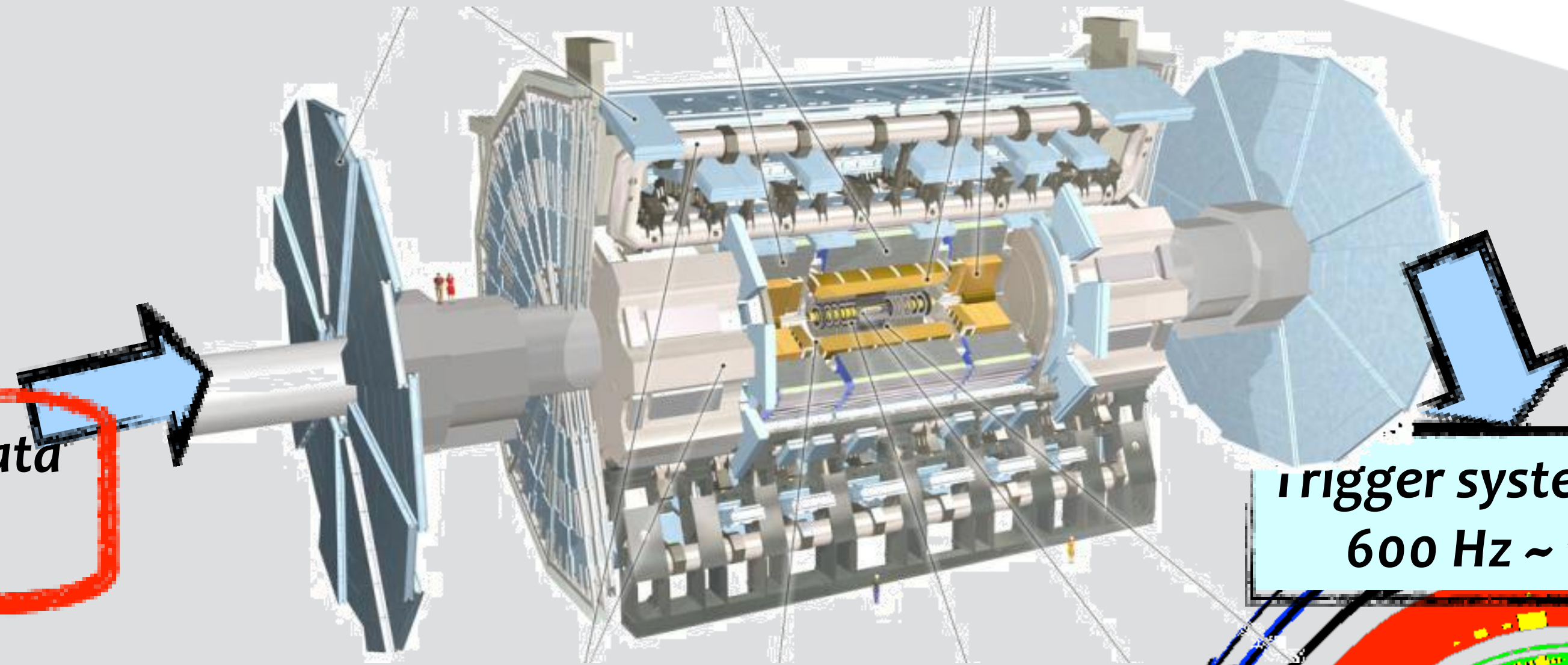
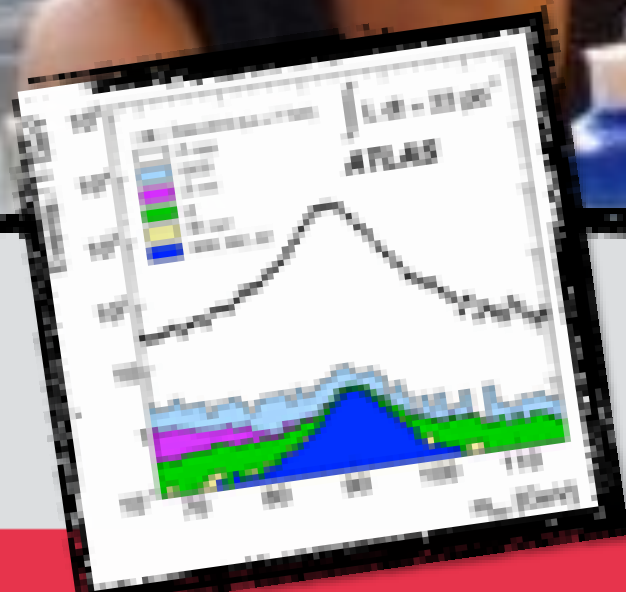


Detector to Doctor ...



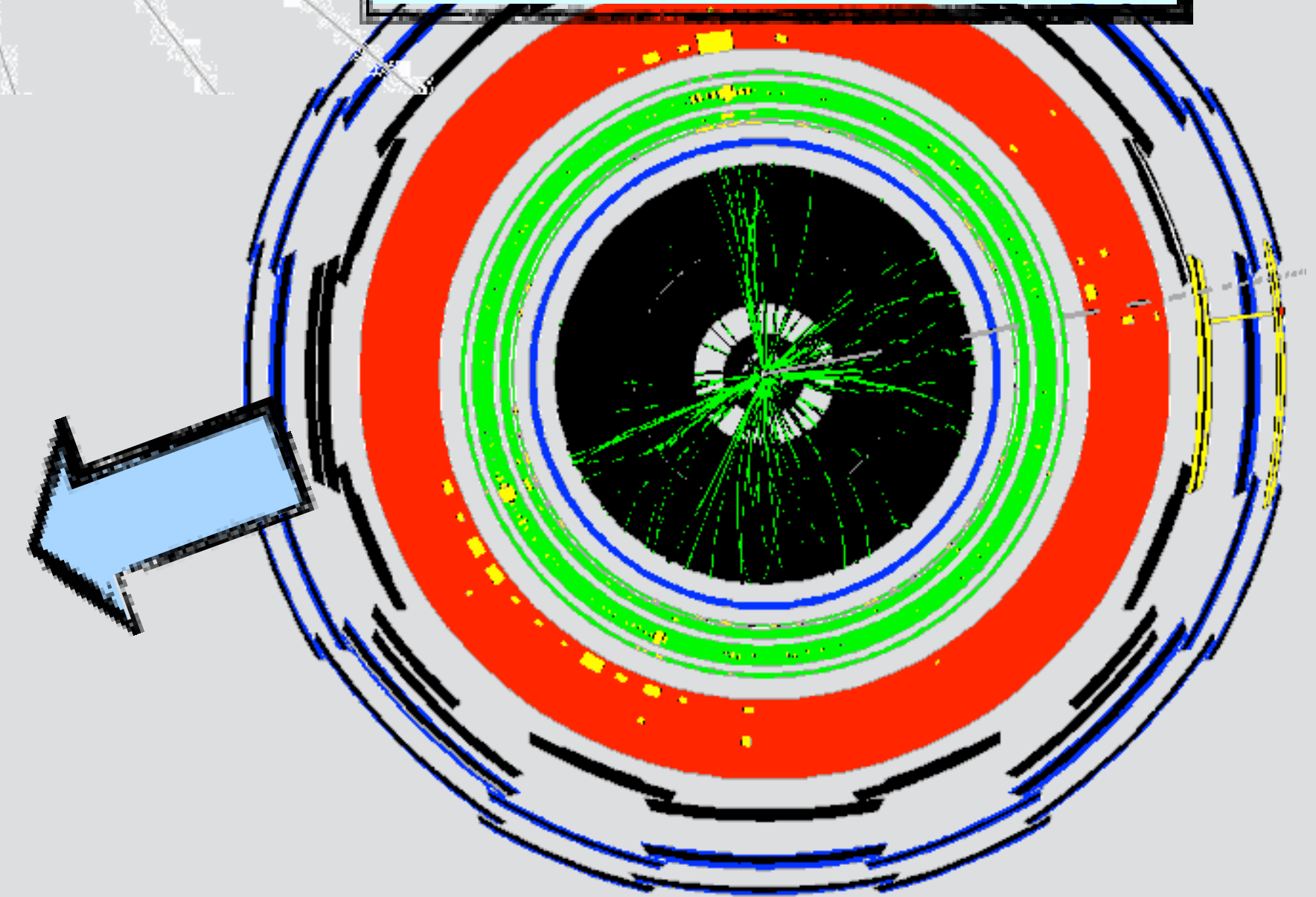
40 miljoen / seconde

Analysis of collision data
by PhD students



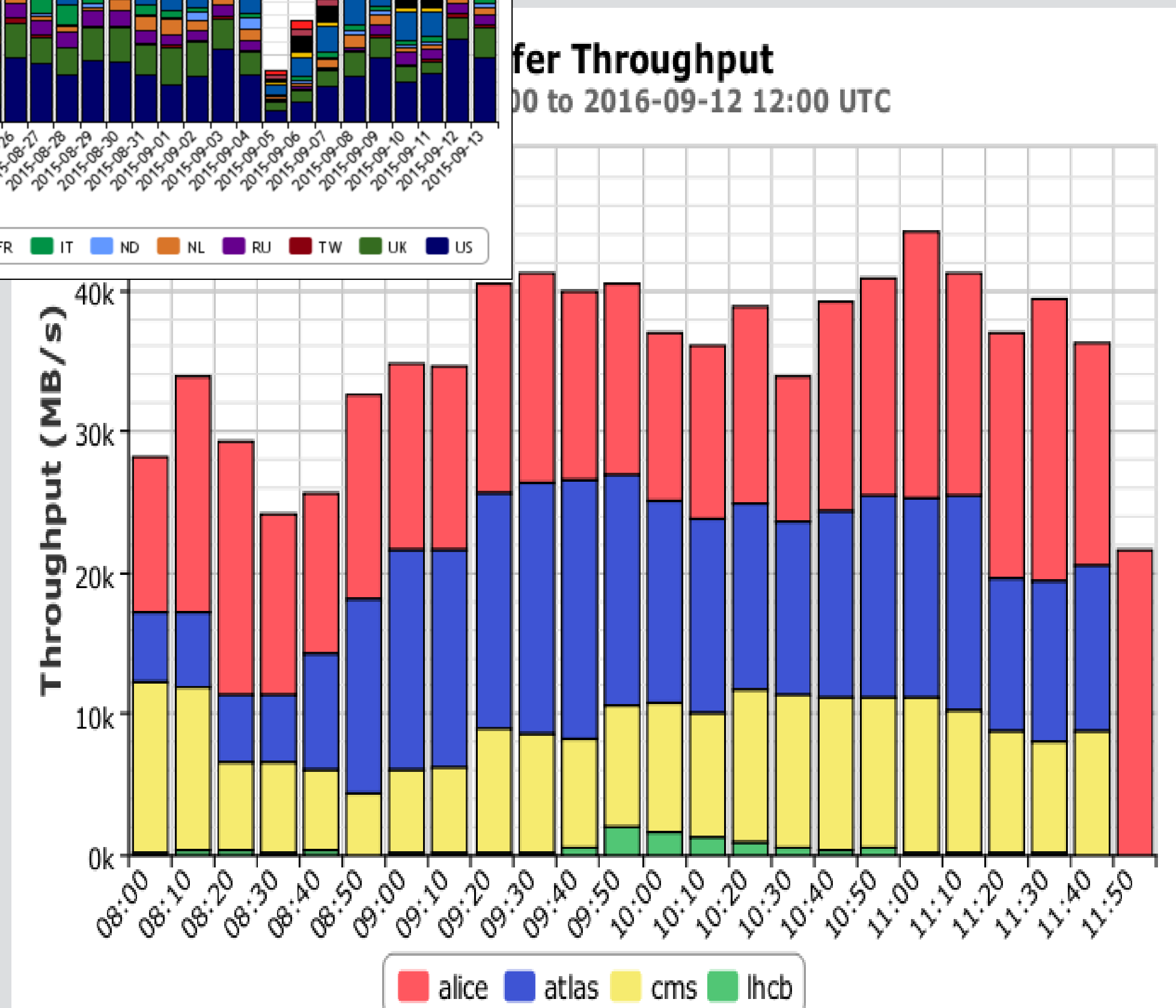
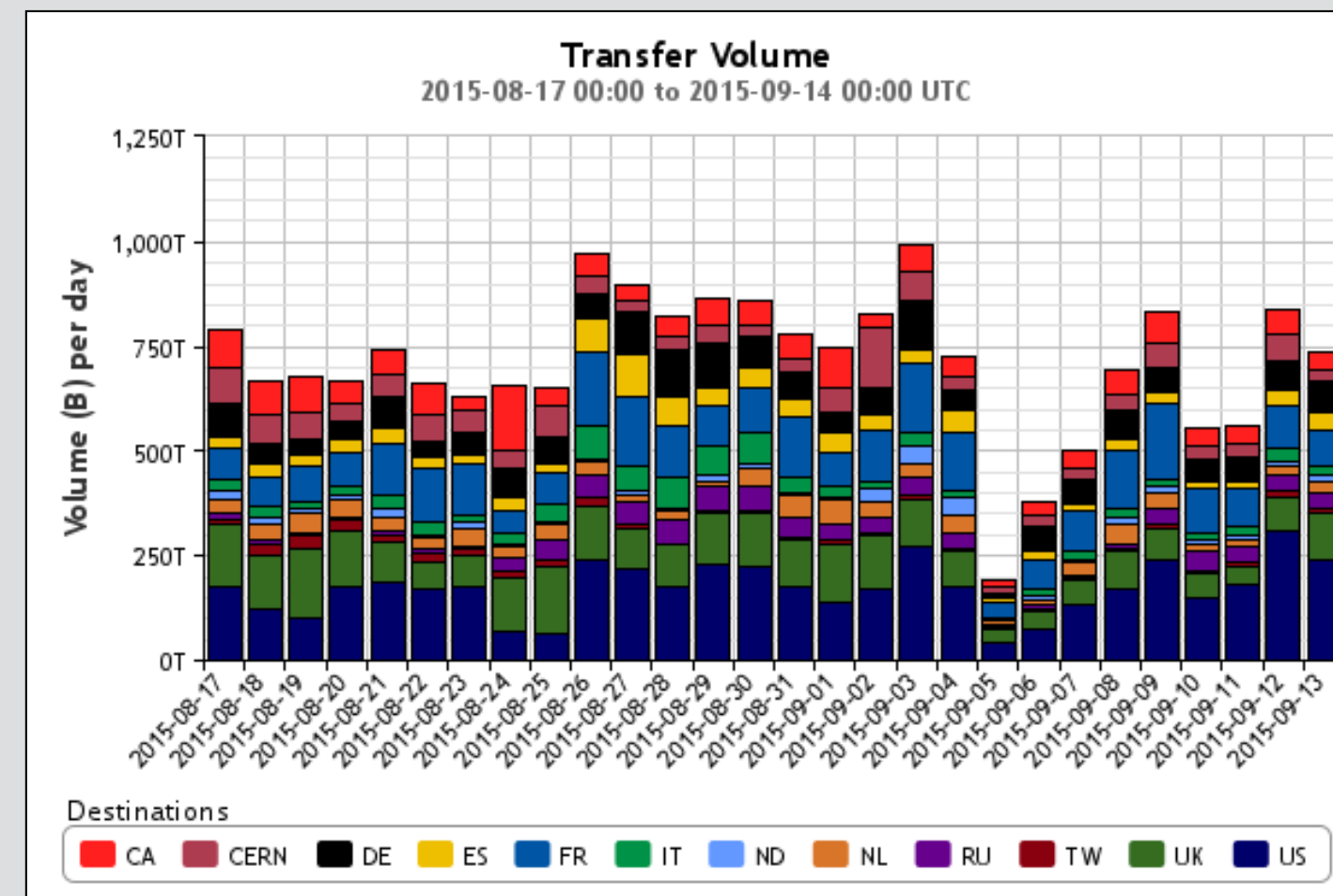
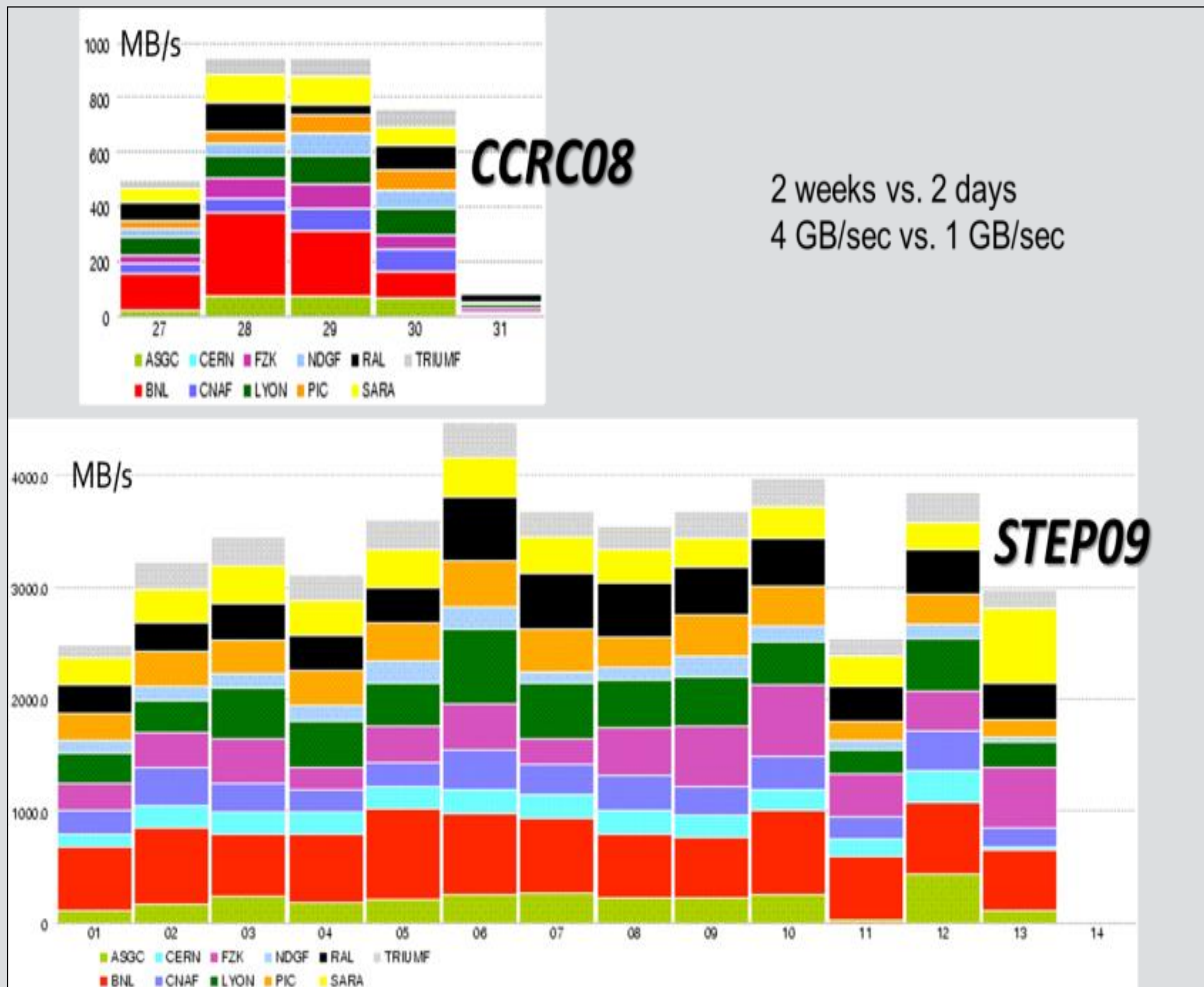
Trigger systeem selecteert
600 Hz ~ 1 GB/s data

Data distribution in
EGI, OSG, ... through WLCG



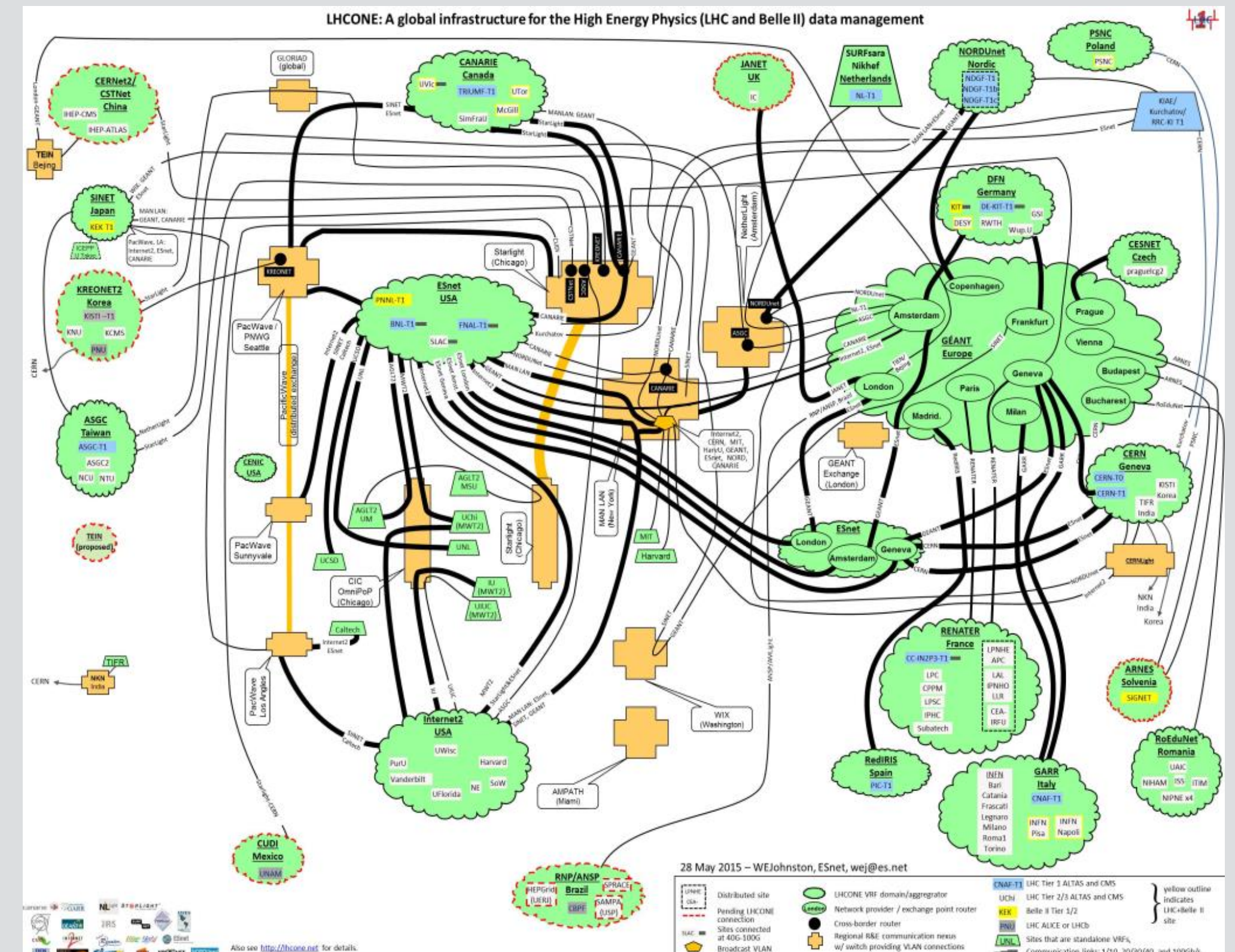
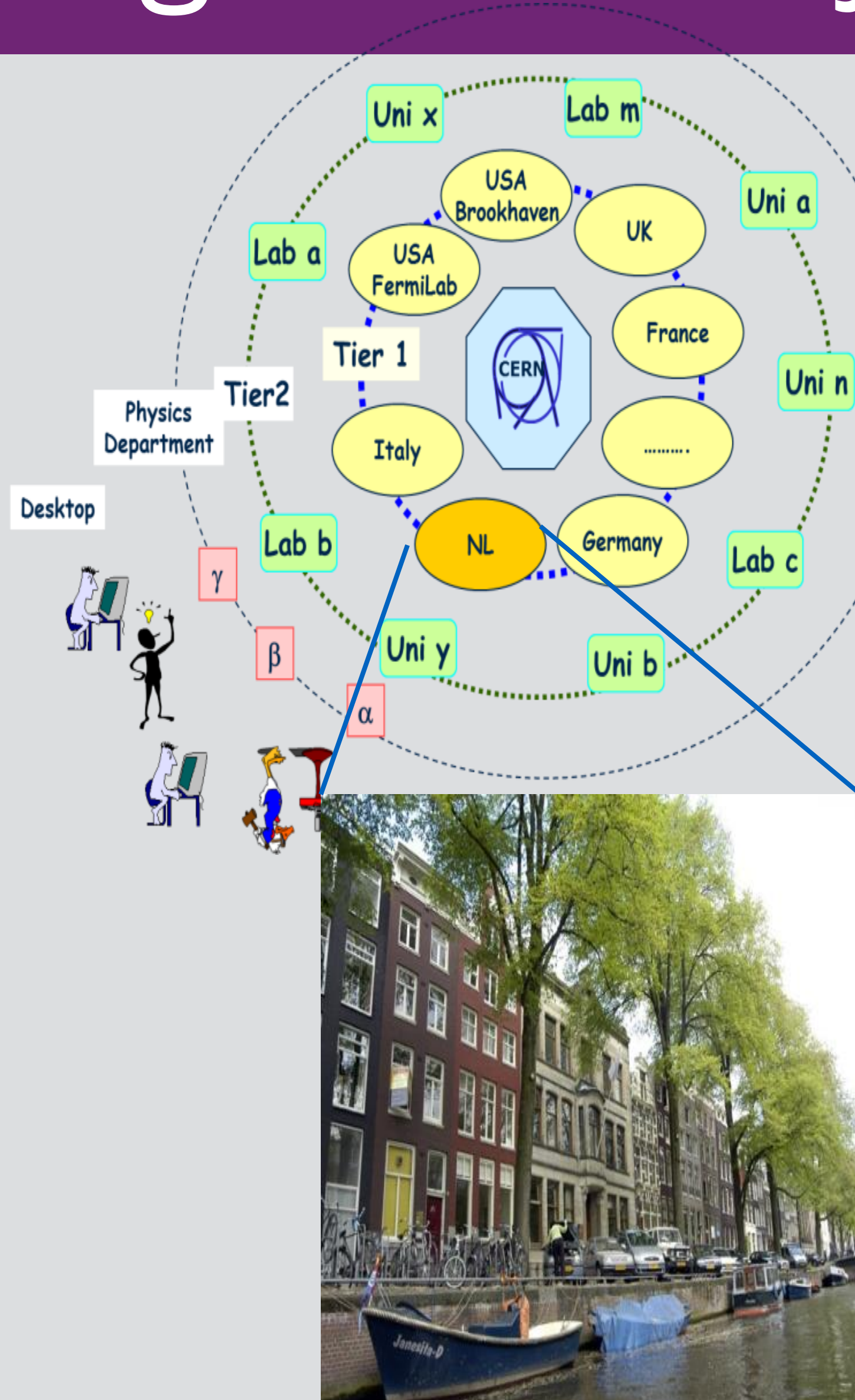
Prepare early, test often

**Global transfer rates now > 40 GB/s –
acquisition:10 PB/mo (~x2 derived data)**

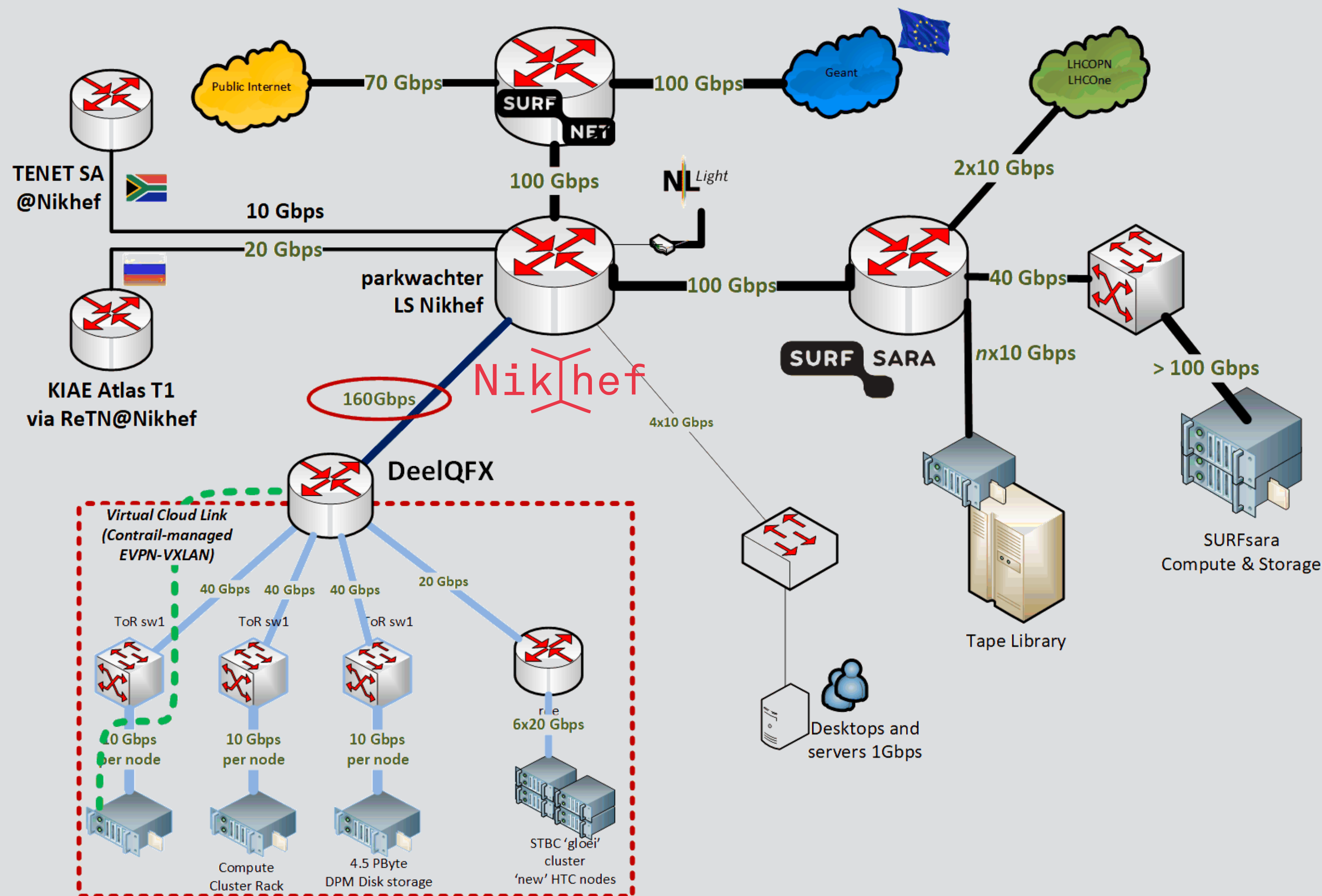


A global system of systems

From hierarchical data distribution to a full mesh and dynamic data placement



Nikhef and the World



Design basis

- data intensive compute
- guaranteed I/O rate per data volume
- PaaS/IaaS dynamic function assignment
- open peering policy
- reliable hosting at AMS-IX certified DC

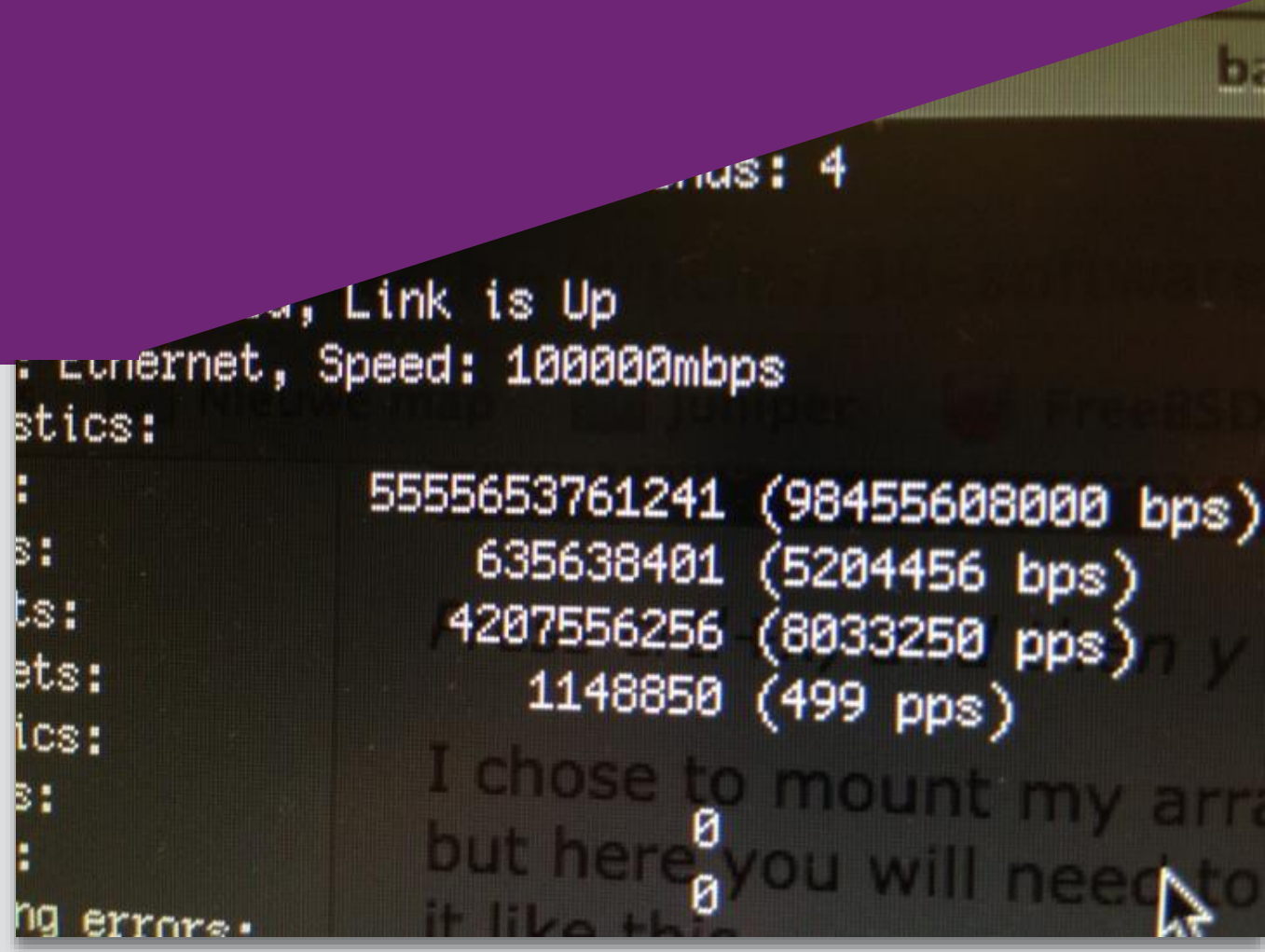
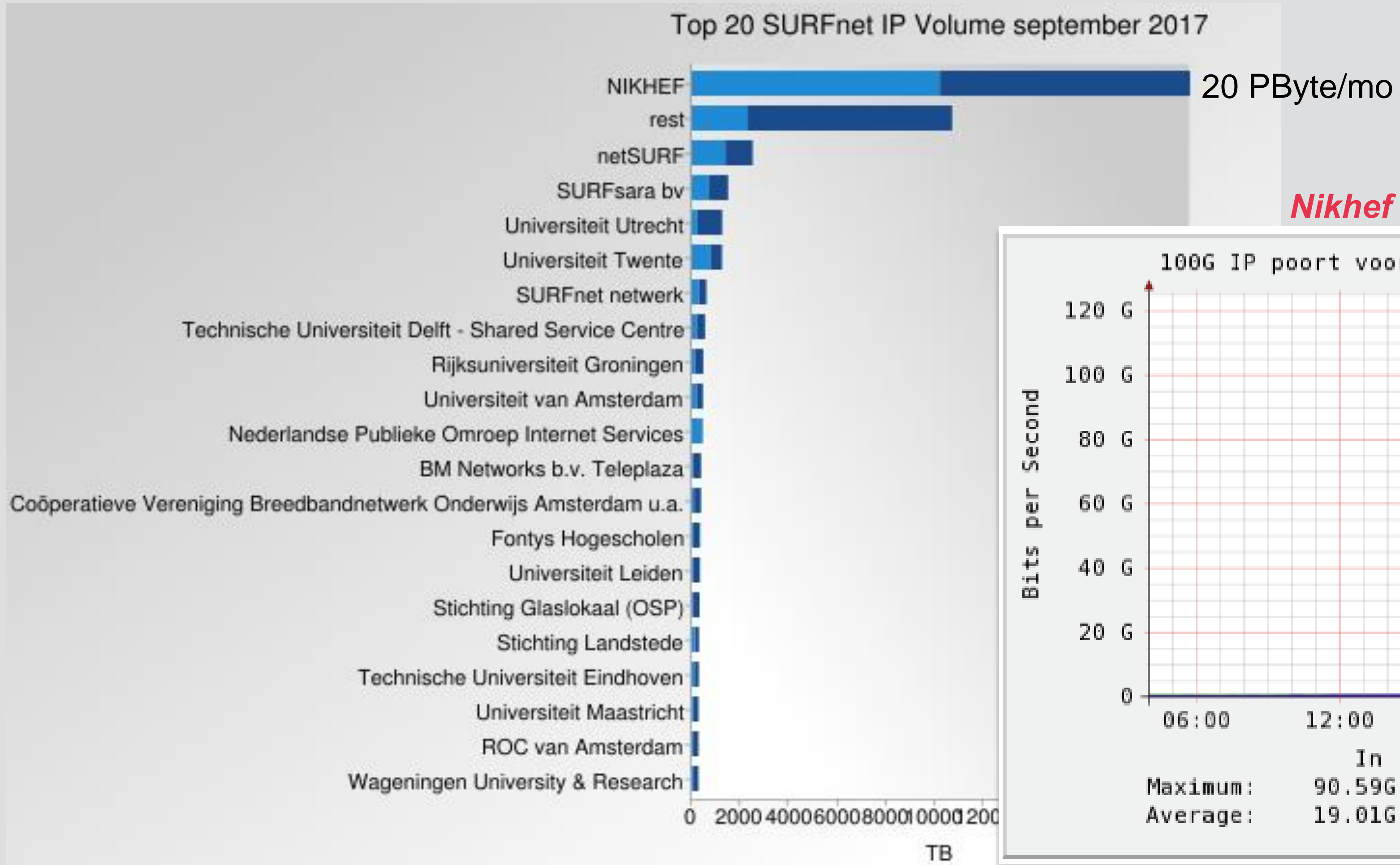
Key figures

1.2Tbps compute and data backbone
330 Gbps wide-area interconnect
4.5 PByte disk storage DPM
1.2 PByte disk storage dCache
5500 compute cores
dedicated hosting security services

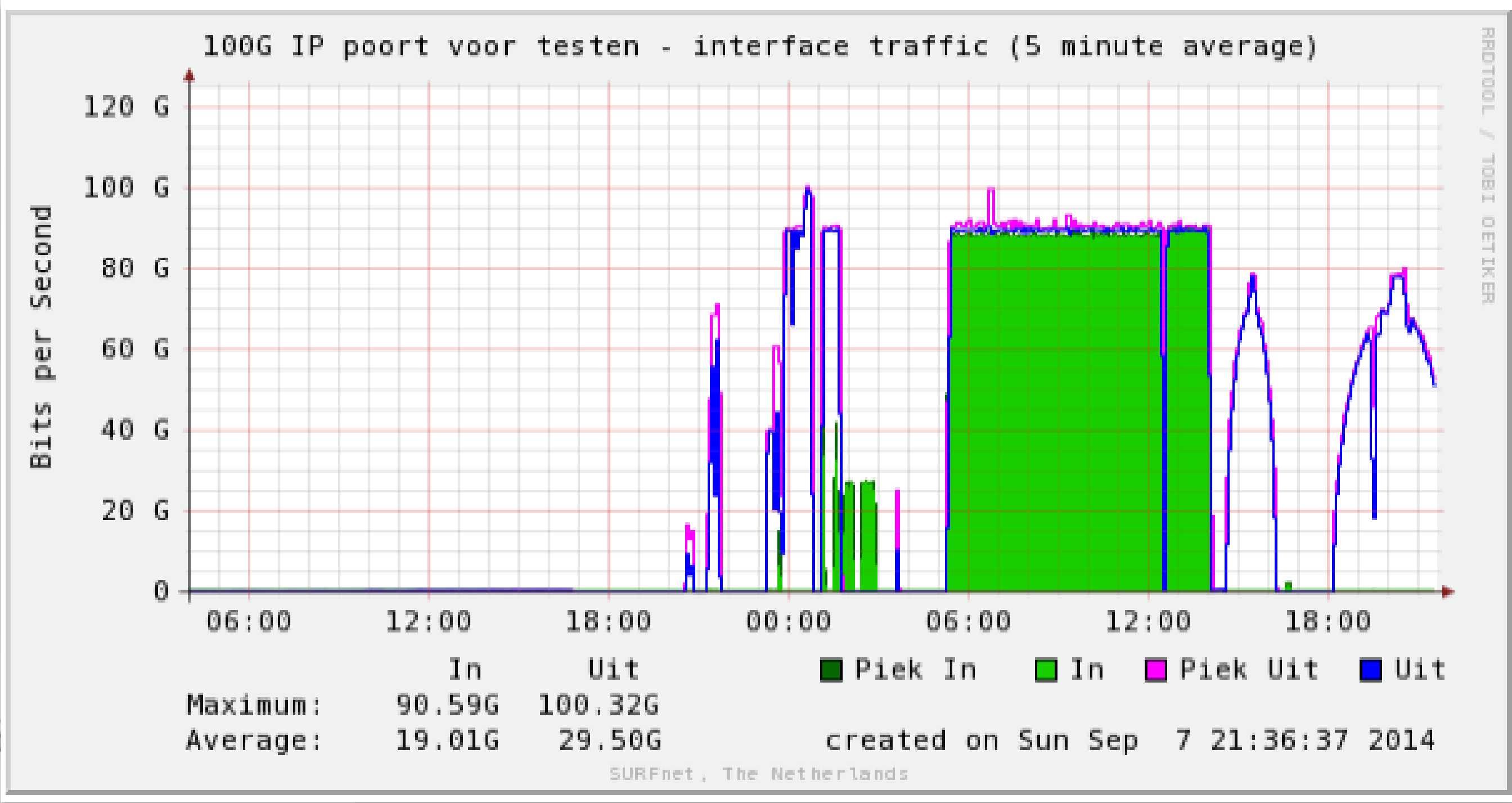
Experimental 'playground' facilities
for trials with network, CPU and
storage vendors, and Nikhef capabilities

just do it . . .

Nikhef fraction of total SURFnet (NL Academic) traffic, September 2017

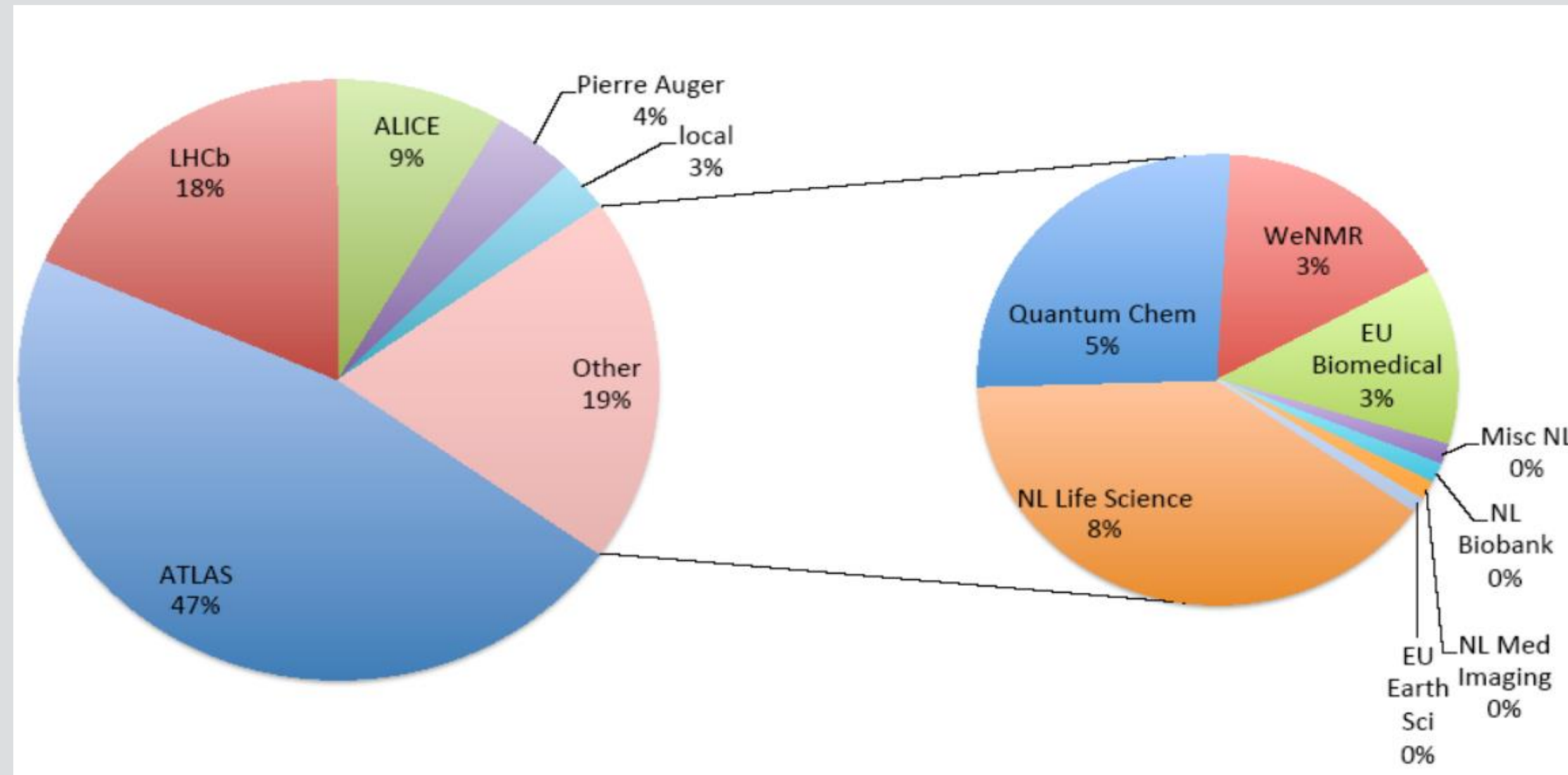


Nikhef → SURFnet → RUG-CIT/UvA – validation in 2015



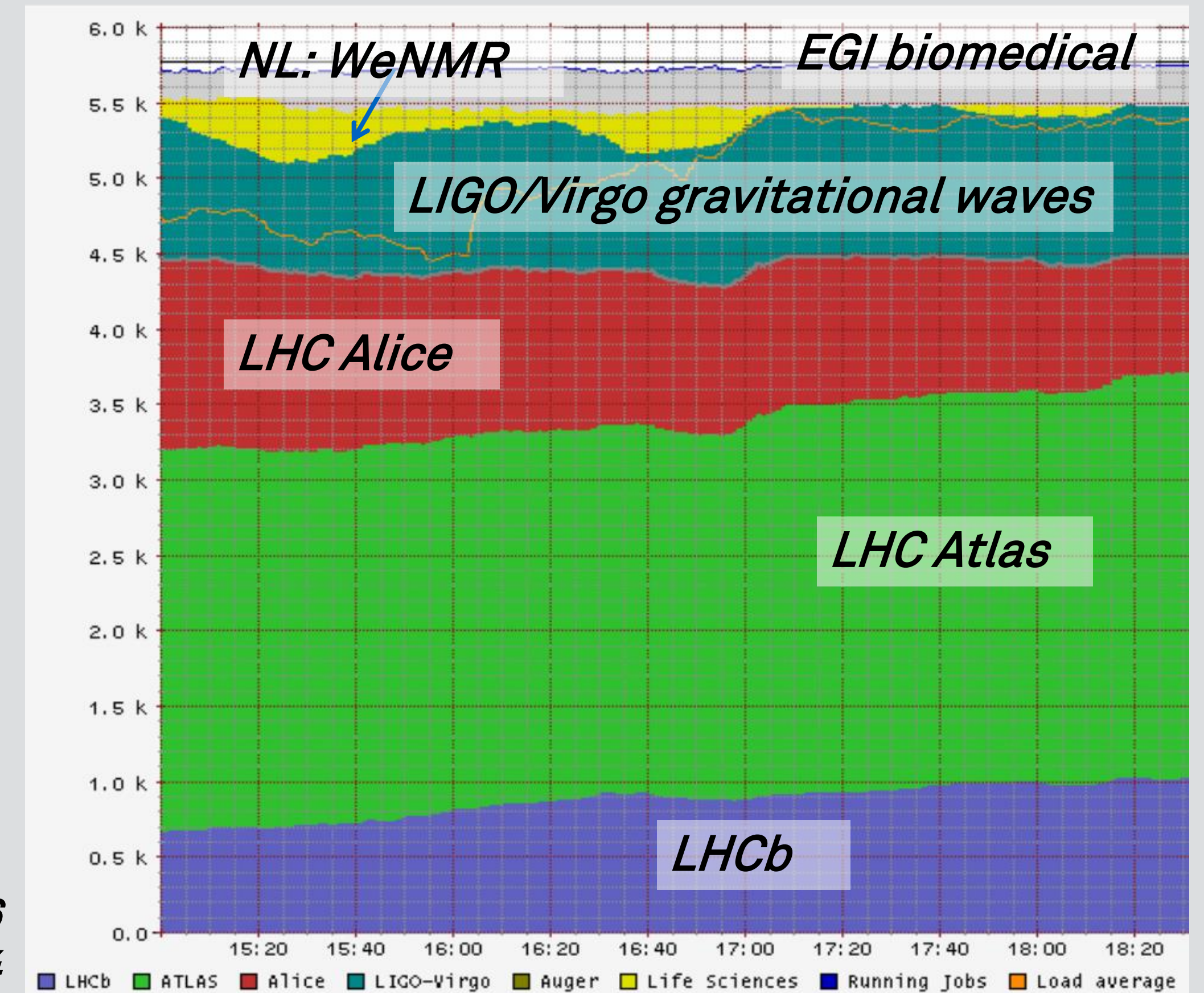
and keep it efficient by joining up

>98% utilisation, >90% efficiency

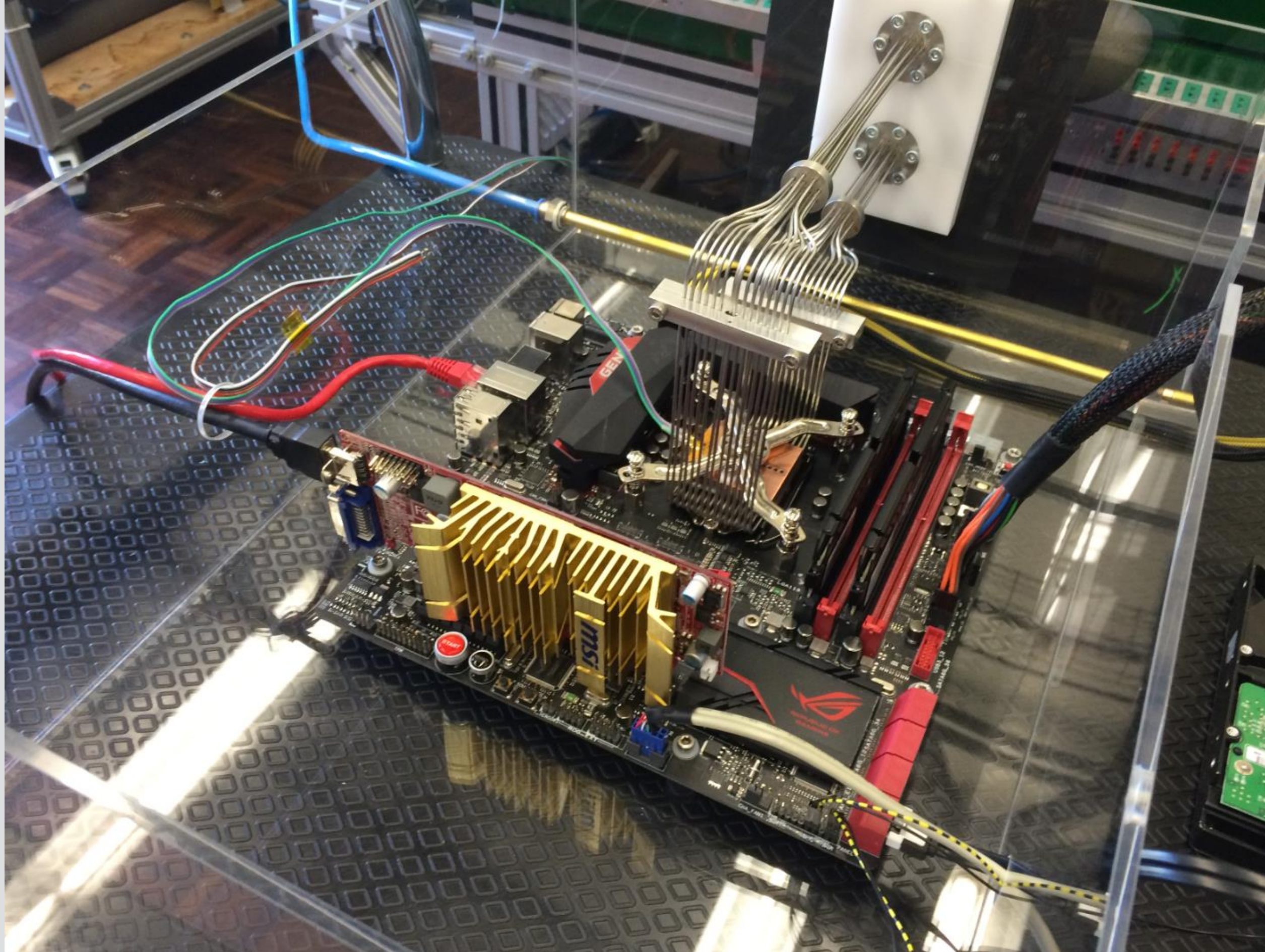


Right:: NIKHEF-ELPROD facility, Friday, Dec 9th, 2016

Left: annual usage distribution 2013-2014



Because something are fun



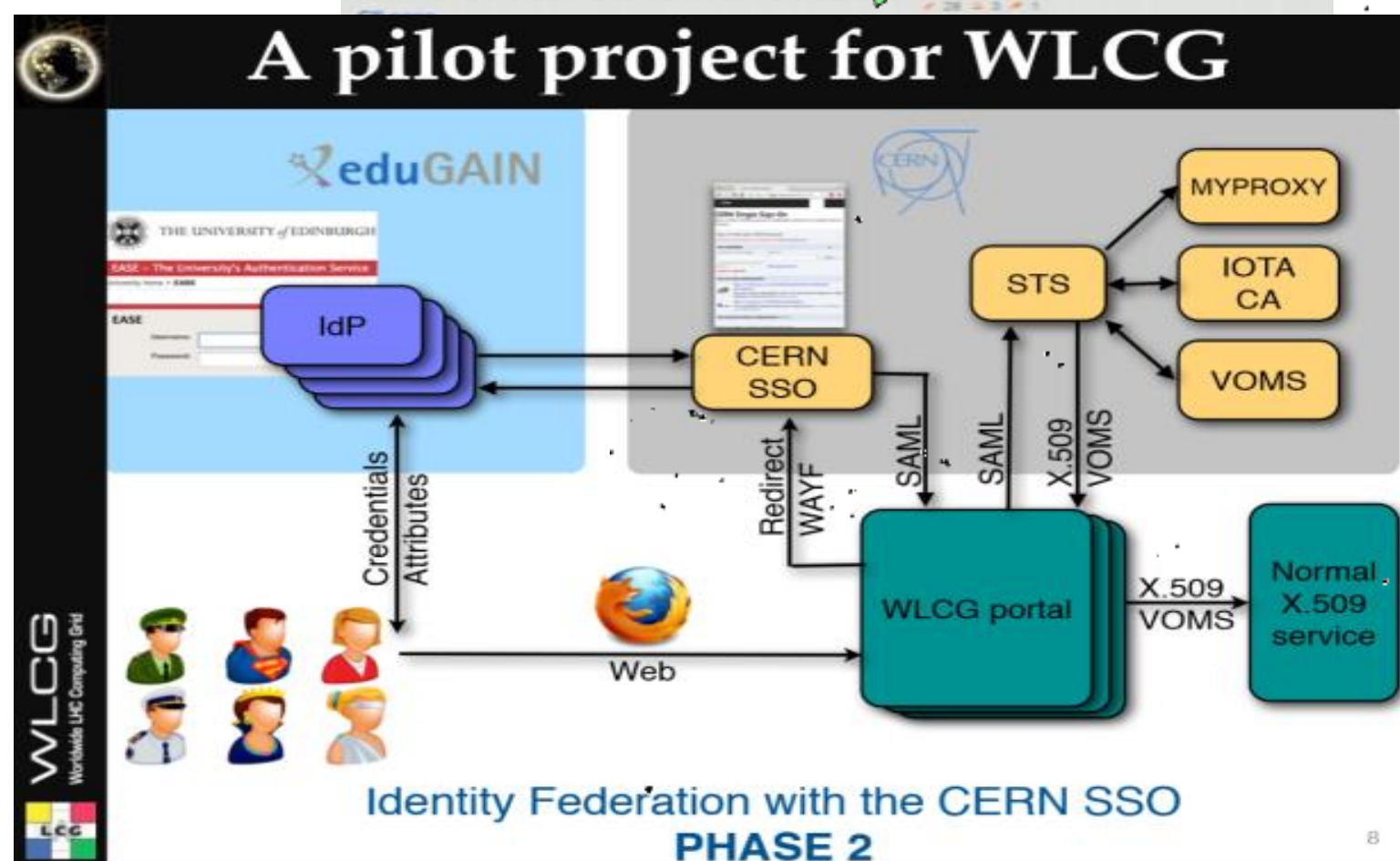
... but not the long-term solution!

So we need to work together

eduGAIN

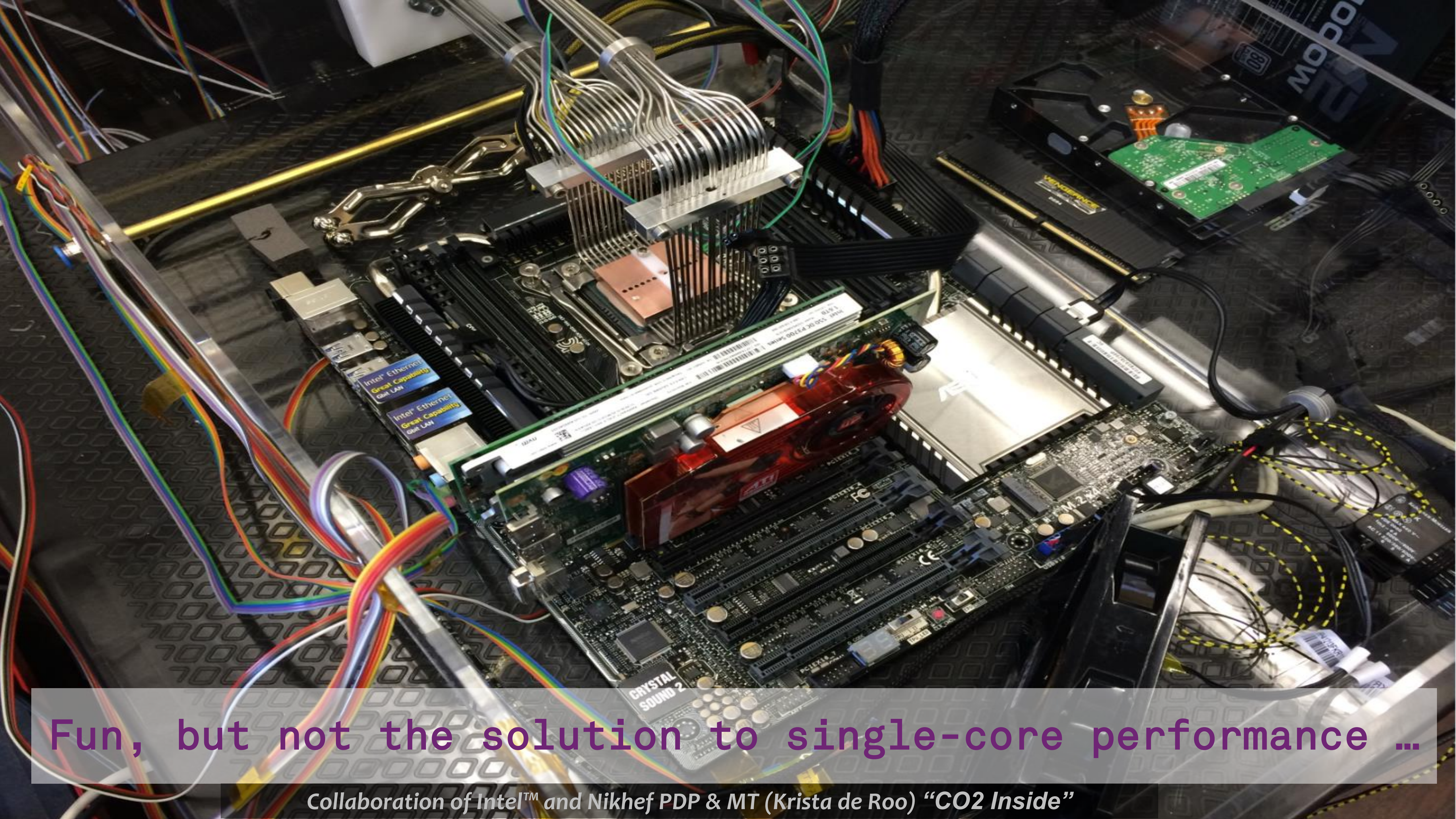
CI Logon Service

wLCG FIM4R pilot



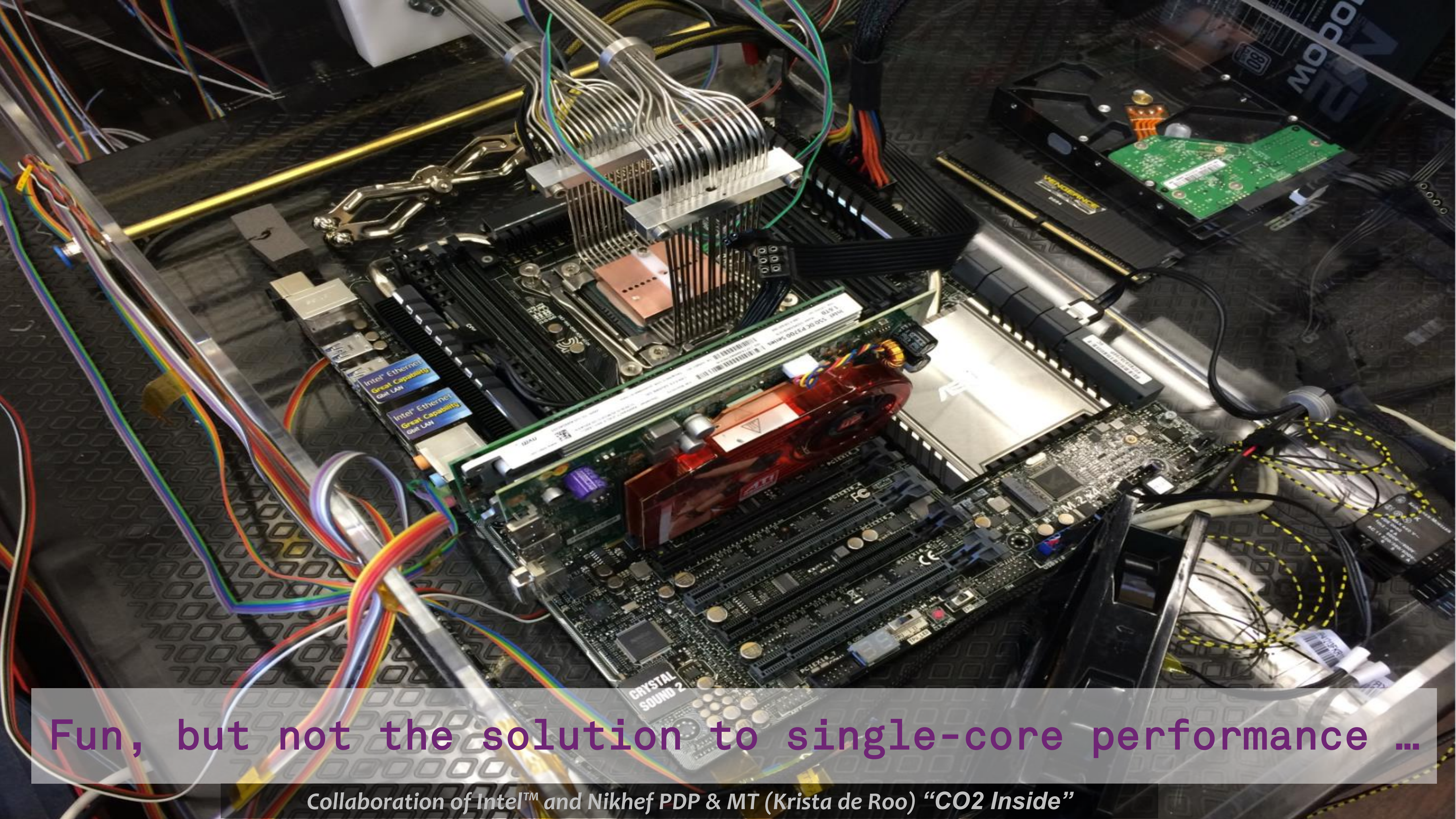
RCauth(.eu)

IGTF
Interoperable Global Trust Federation
AP | EU | TAG

A detailed view of a computer motherboard with various components, including a CPU, RAM, and multiple cables, illustrating a complex hardware setup. The image shows a dense arrangement of electronic components on a dark printed circuit board. A central CPU is visible, surrounded by numerous pins and connectors. Several RAM modules are installed in slots. A large, multi-colored cable bundle is connected to the motherboard. Other components include a power supply unit, a fan, and various peripheral connectors. The overall scene depicts a highly customized or experimental hardware configuration.

Fun, but not the solution to single-core performance ...

Collaboration of Intel™ and Nikhef PDP & MT (Krista de Roo) “CO2 Inside”

A detailed view of a computer motherboard with various components, including a CPU, RAM, and multiple cables, illustrating a complex hardware setup. The image shows a dense arrangement of electronic components on a dark green PCB. A large, multi-pin connector is visible at the top, with numerous thin wires connected to it. Several RAM modules are installed in the memory slots. A red, rectangular component, likely a graphics card or a specialized processor, is mounted on the board. Numerous colorful cables (red, blue, yellow, green) are plugged into the front panel connectors. The overall scene suggests a high-performance or specialized computing environment.

Fun, but not the solution to single-core performance ...

Collaboration of Intel™ and Nikhef PDP & MT (Krista de Roo) “CO2 Inside”