Welcome to Nikhef

AARC2 2. All Hands Meeting

David Groep

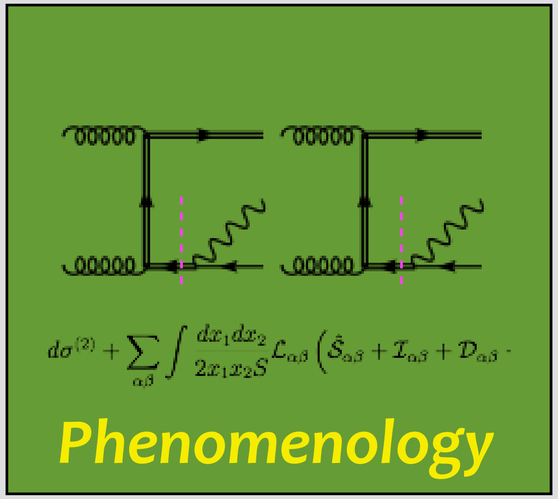
About Nikhef
About the meeting
About dinner

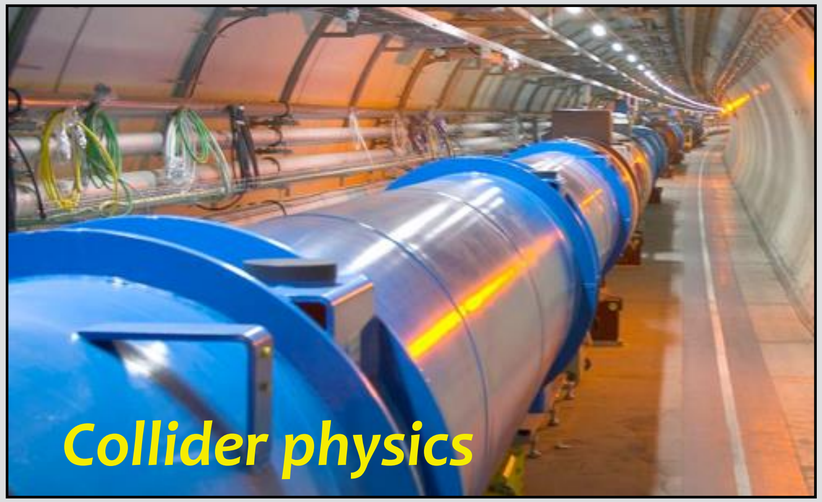
Nikhef

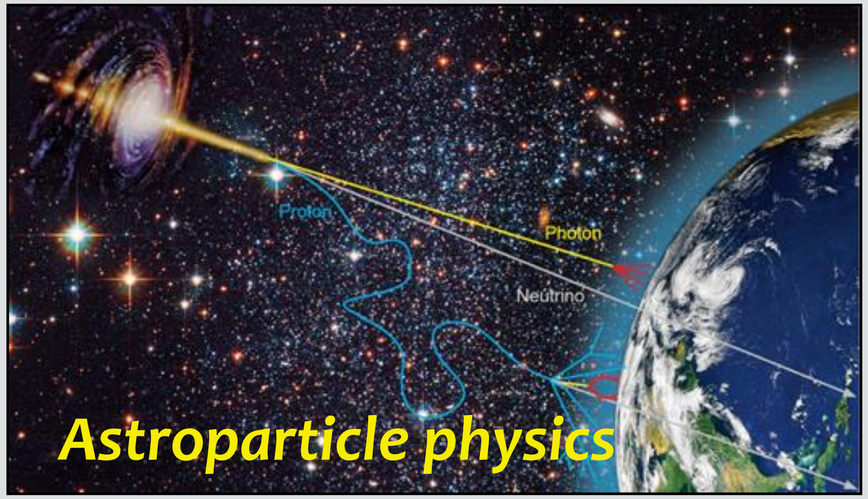
November 2017

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.



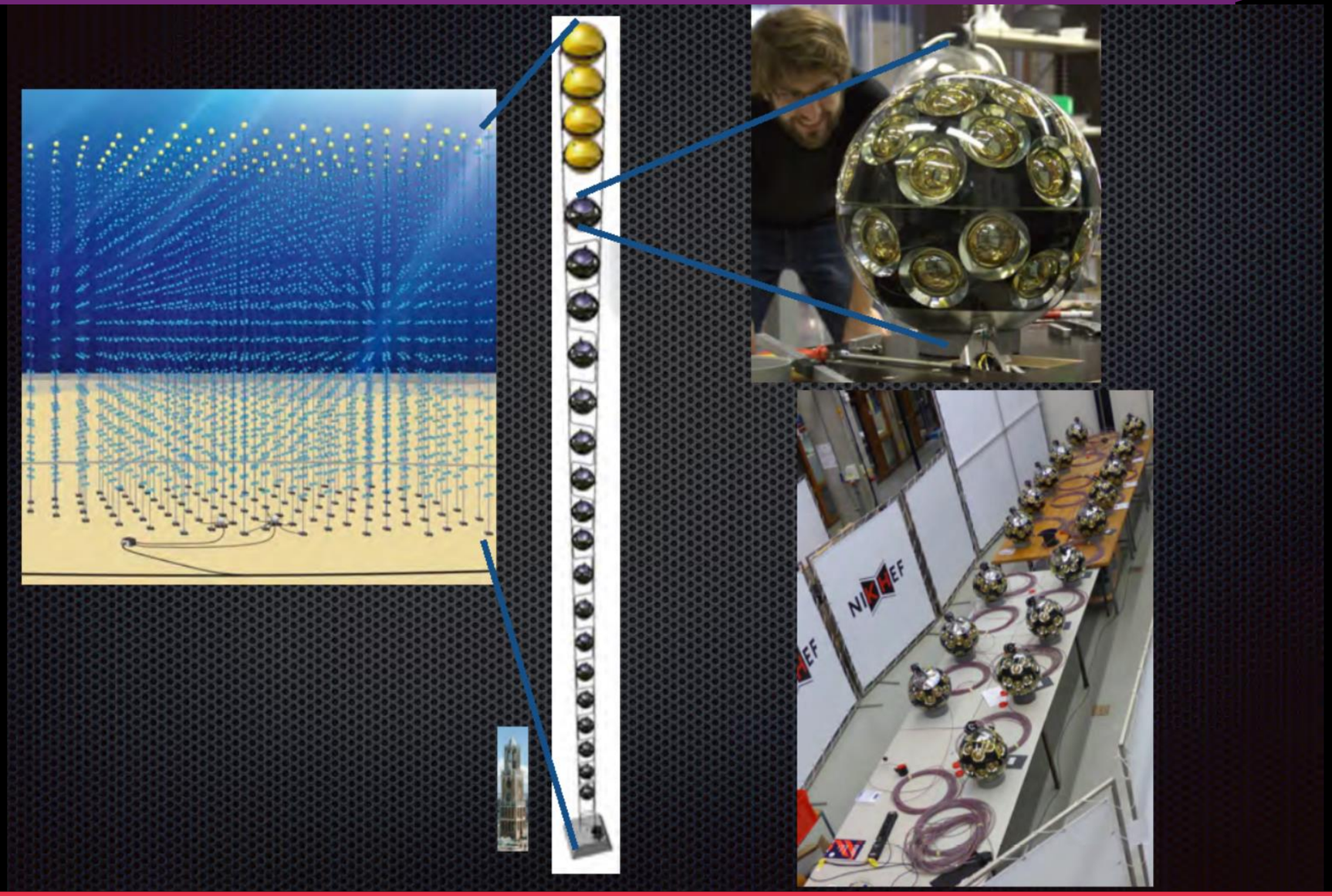




Large Hadron Collider

Nikhef participates in the Atlas, LHCb, and Alice experiments

Neutrinos at Nikhef: KM3Net



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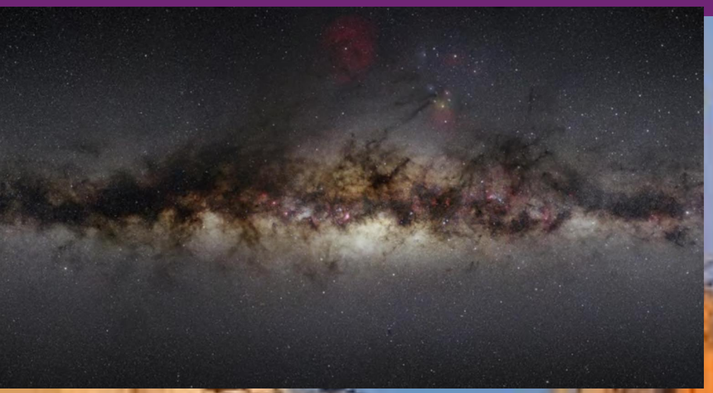
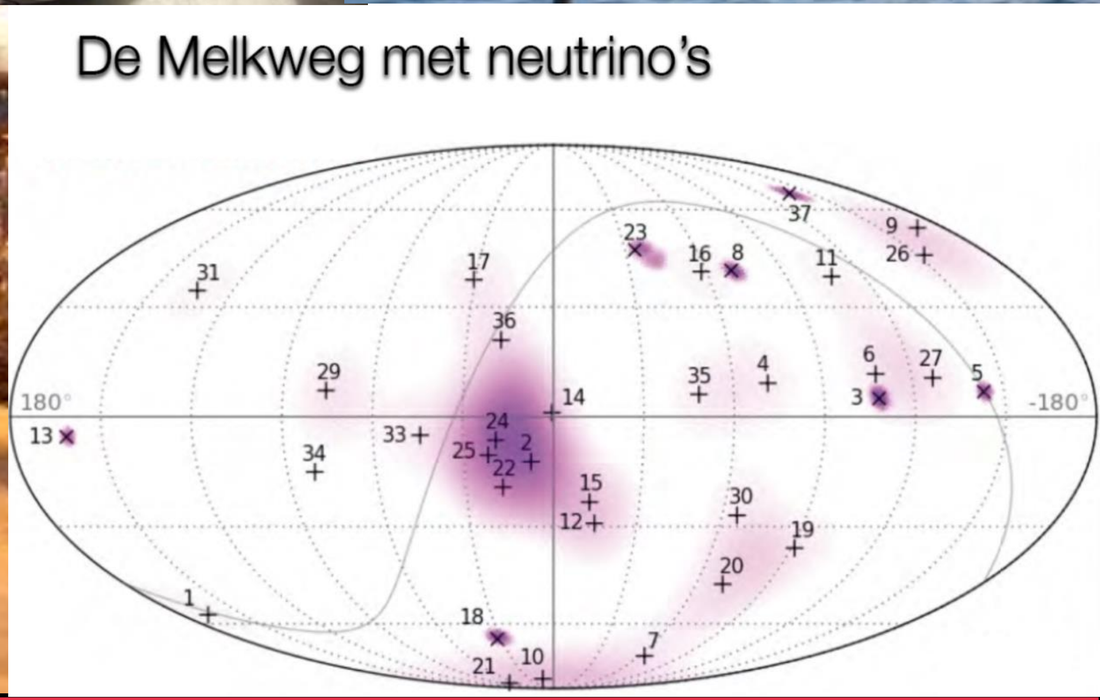
Neutrino at nikhef: KM3Net





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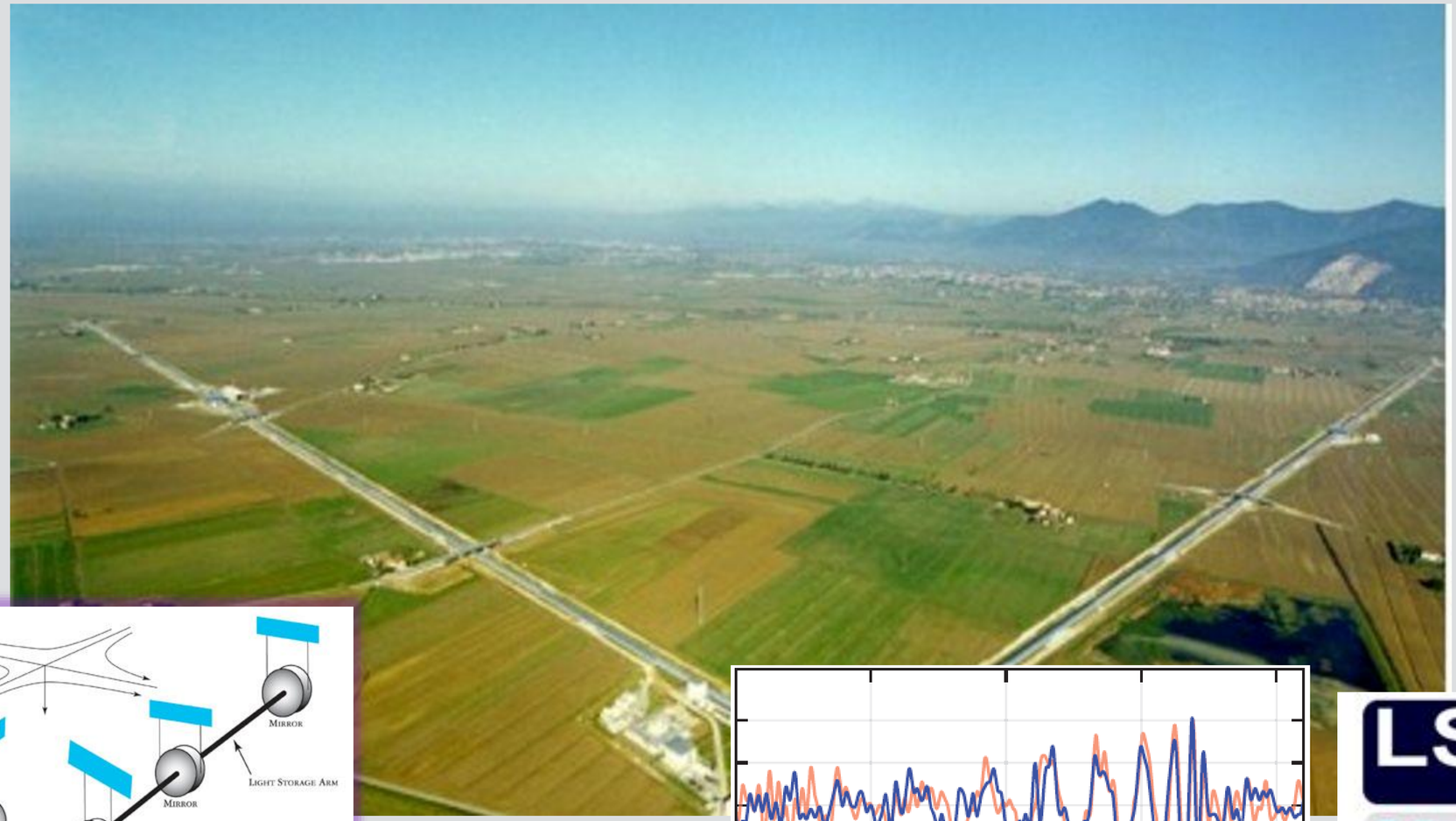
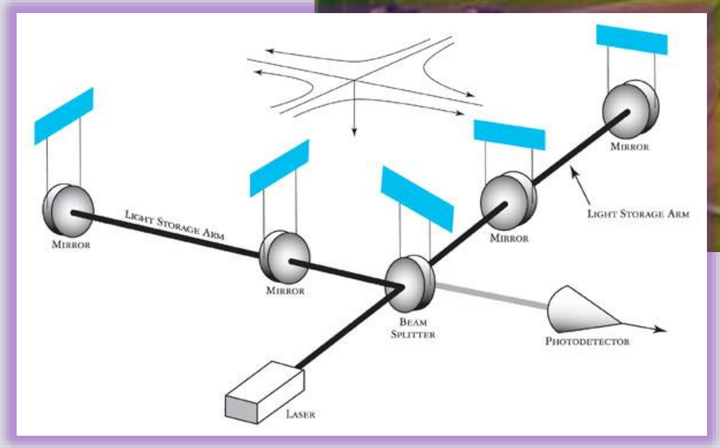
Virgo & LIGO GW astronomy



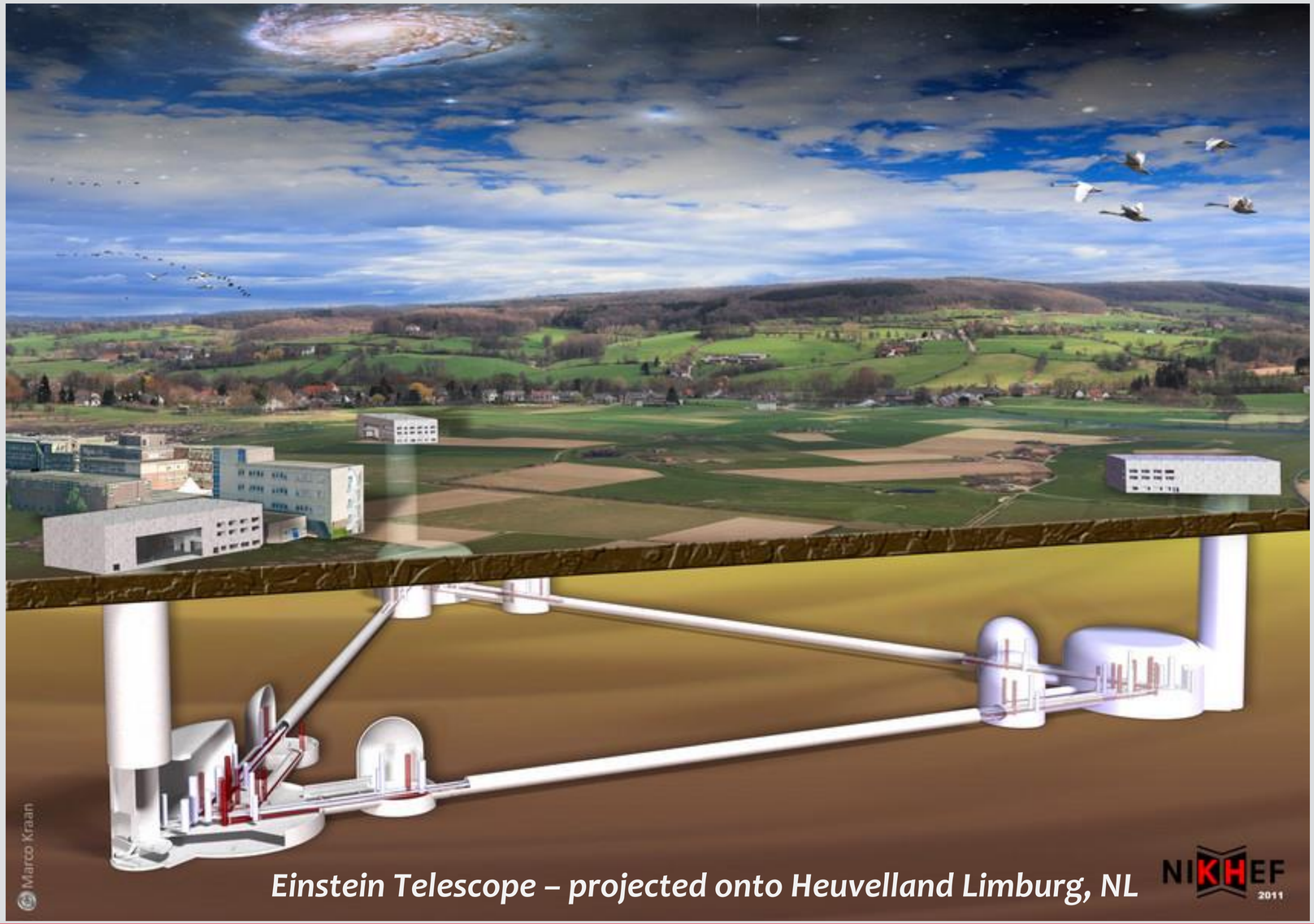


LSC LIGO Scientific Collaboration

VIRGO

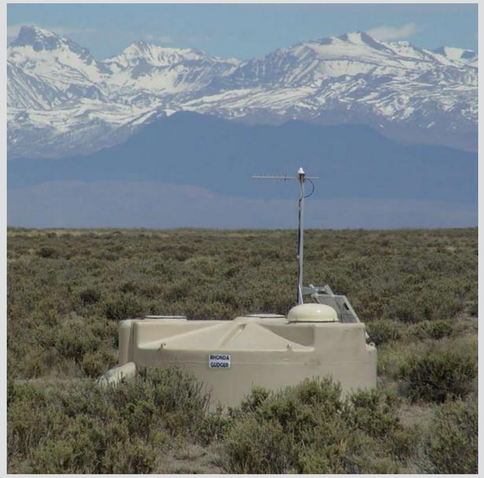
Imagery: gw-astronomy collaborations, LSC

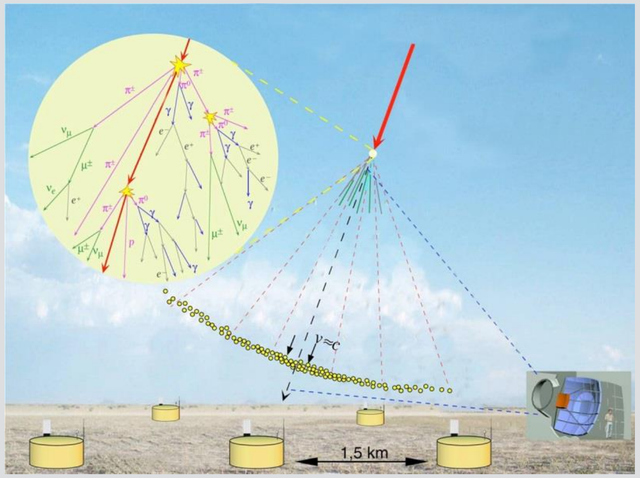
GW Astronomy: ET



Einstein Telescope – projected onto Heuvelland Limburg, NL

Astroparticle Physics





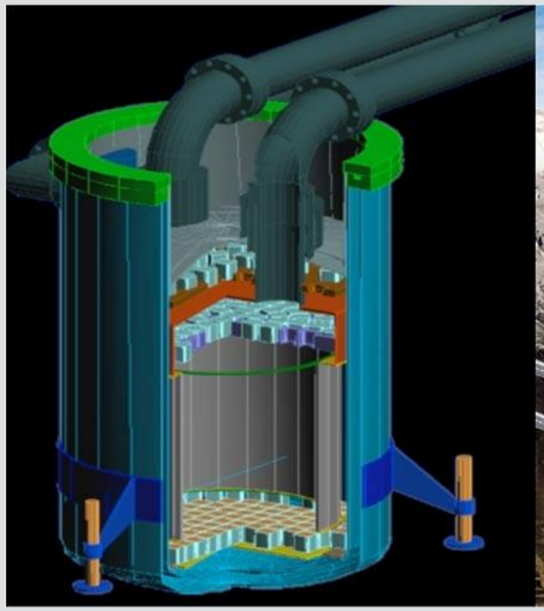
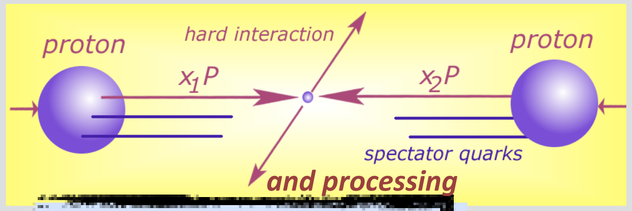


Image sources:
LNGS/INFN,
Xenon collaboration;
Pierre Auger collaboratio
Nikhef

Detector to Doctor ...



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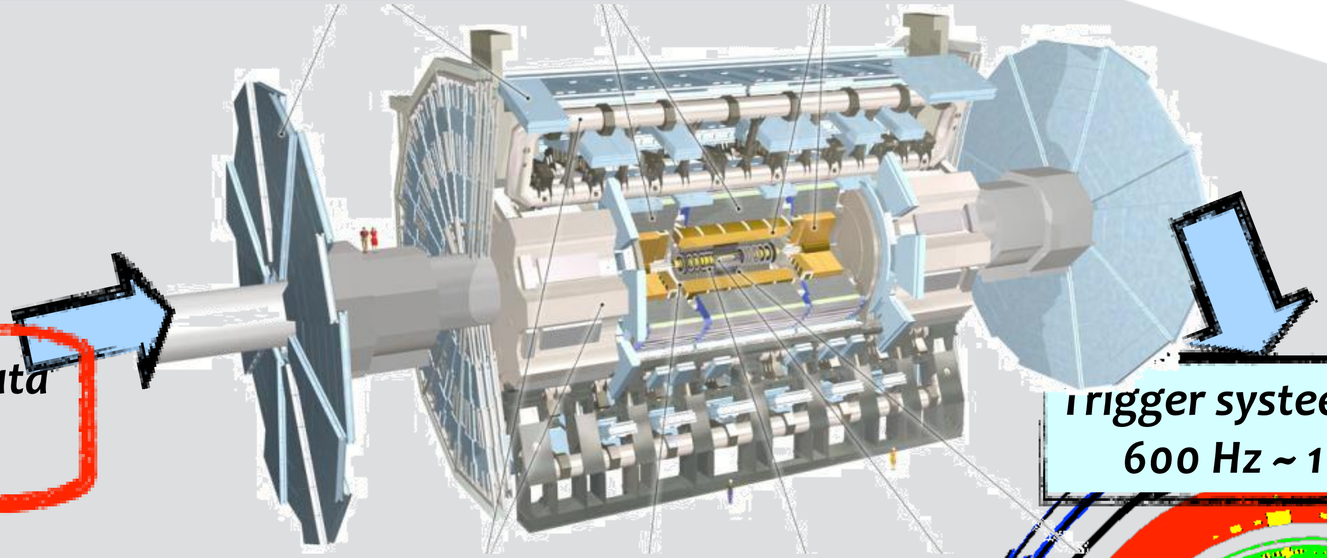
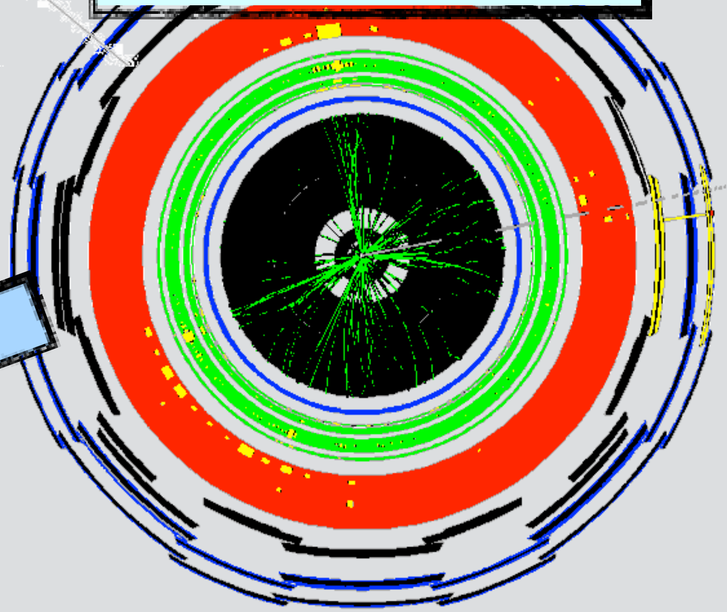
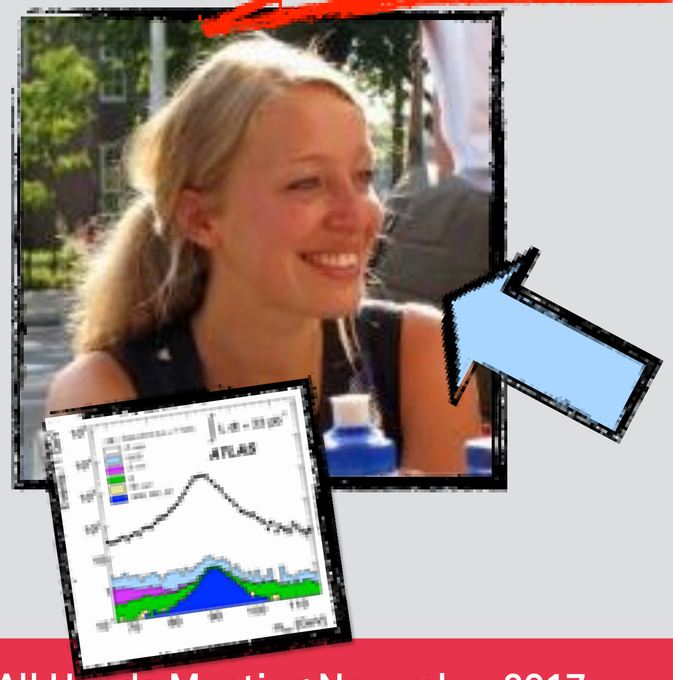


Trigger systeem selecteert
600 Hz ~ 1 GB/s data



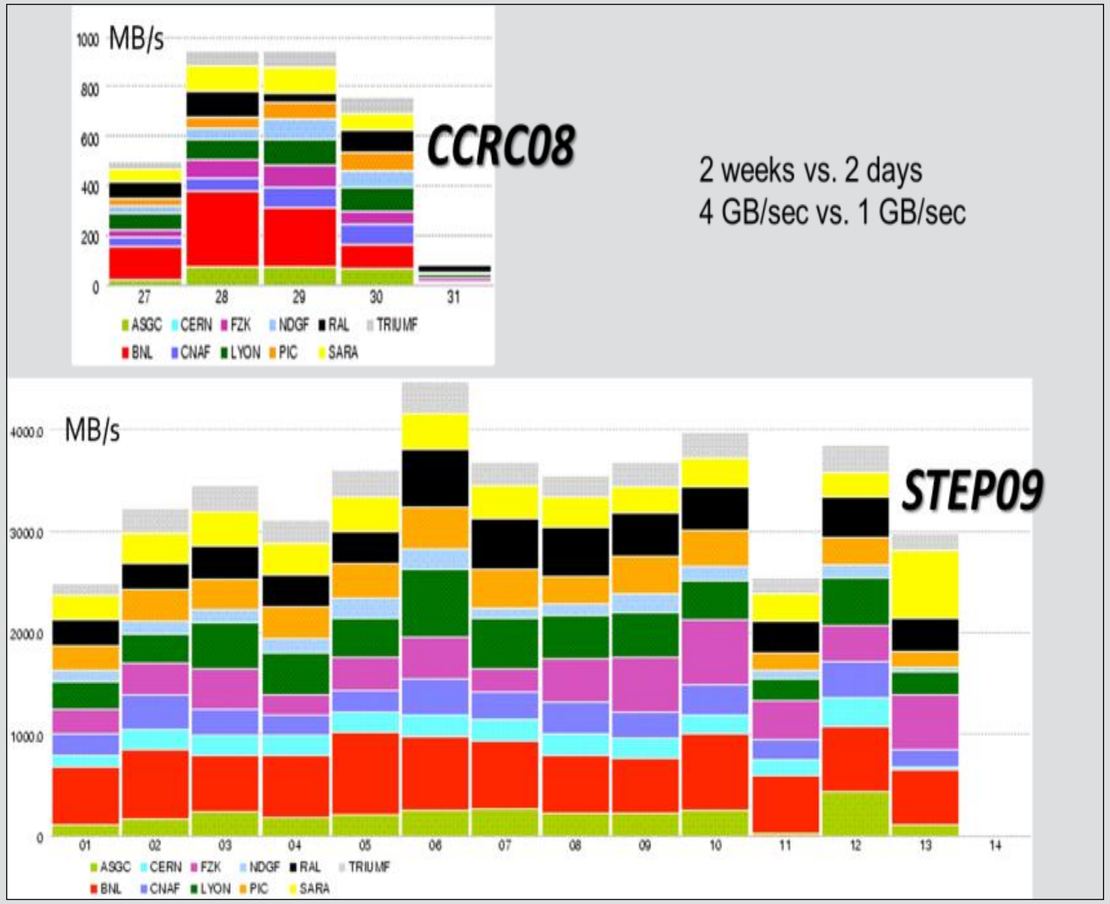
Analysis of collision data
by PhD students

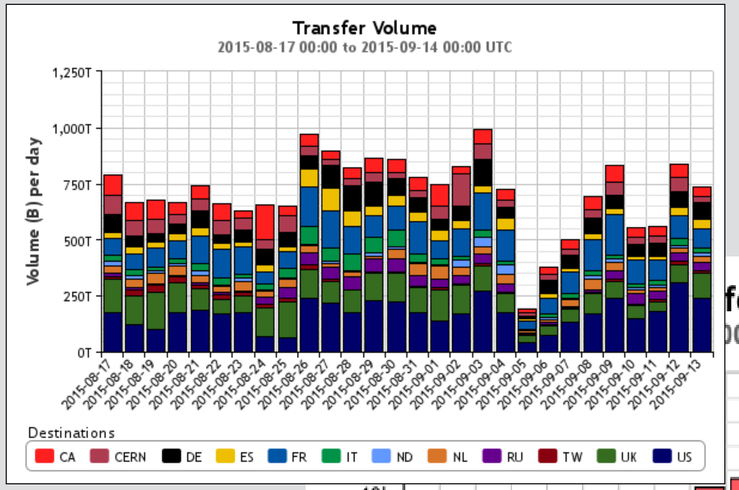


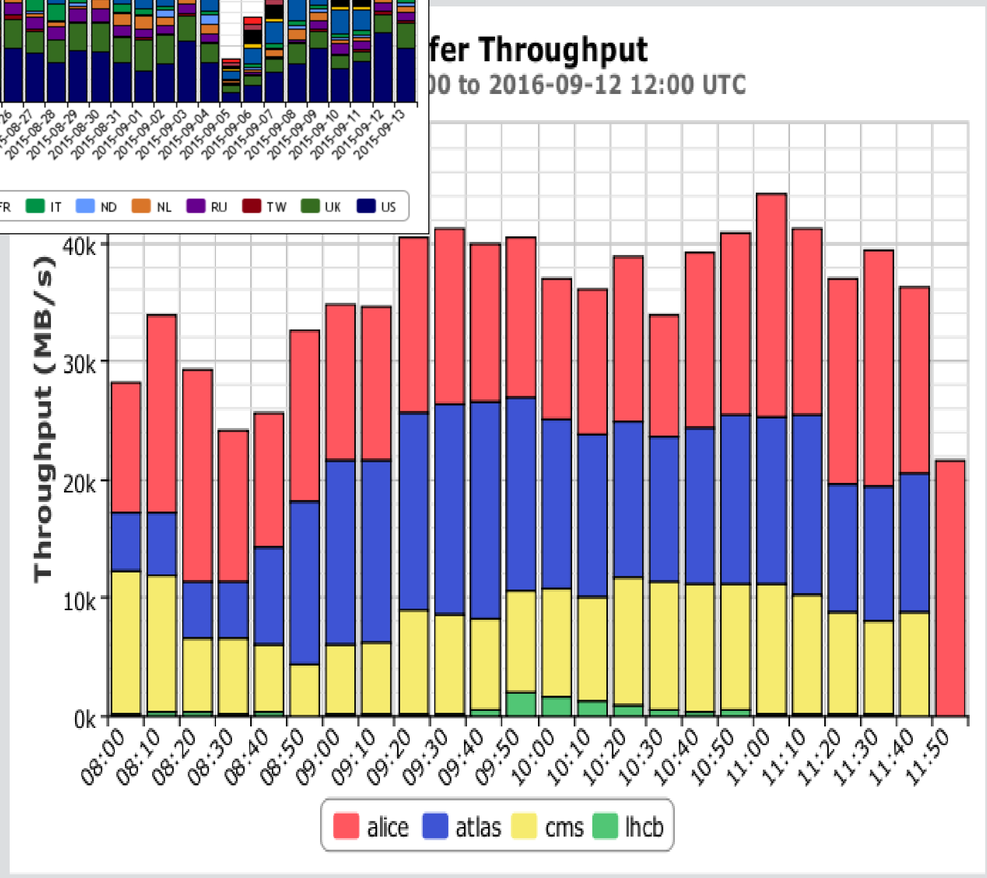
Data distribution in
EGI, OSG, ... through WLCG

Prepare early, test often

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

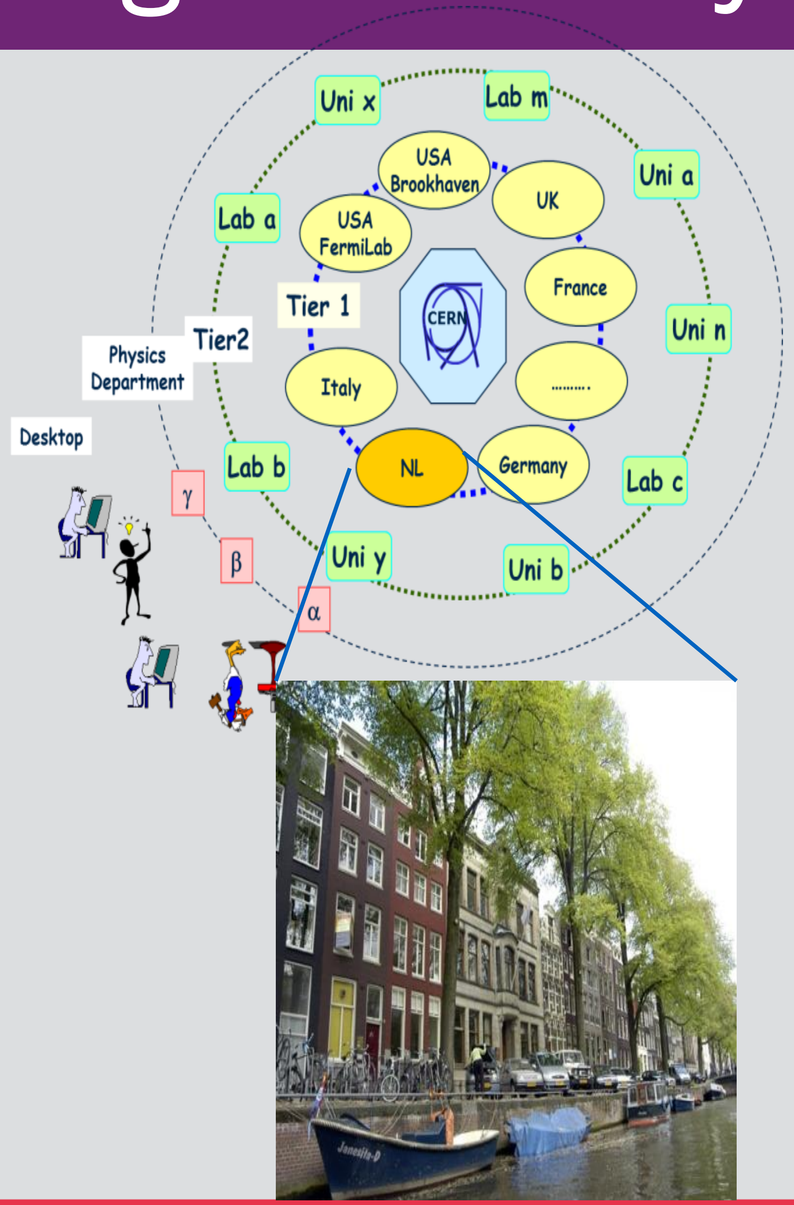




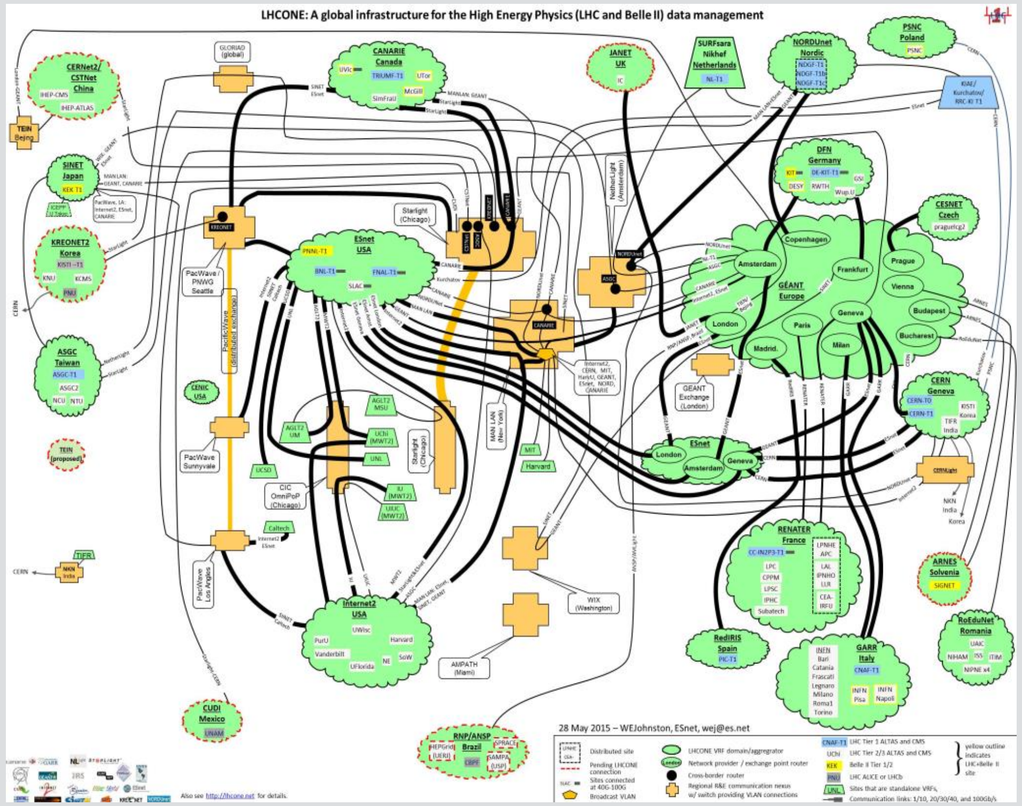


STEP09 : Jamie Shiers, CERN IT/GS; Throughput 2016: WLCG Workshop 2016, Ian Bird, CERN

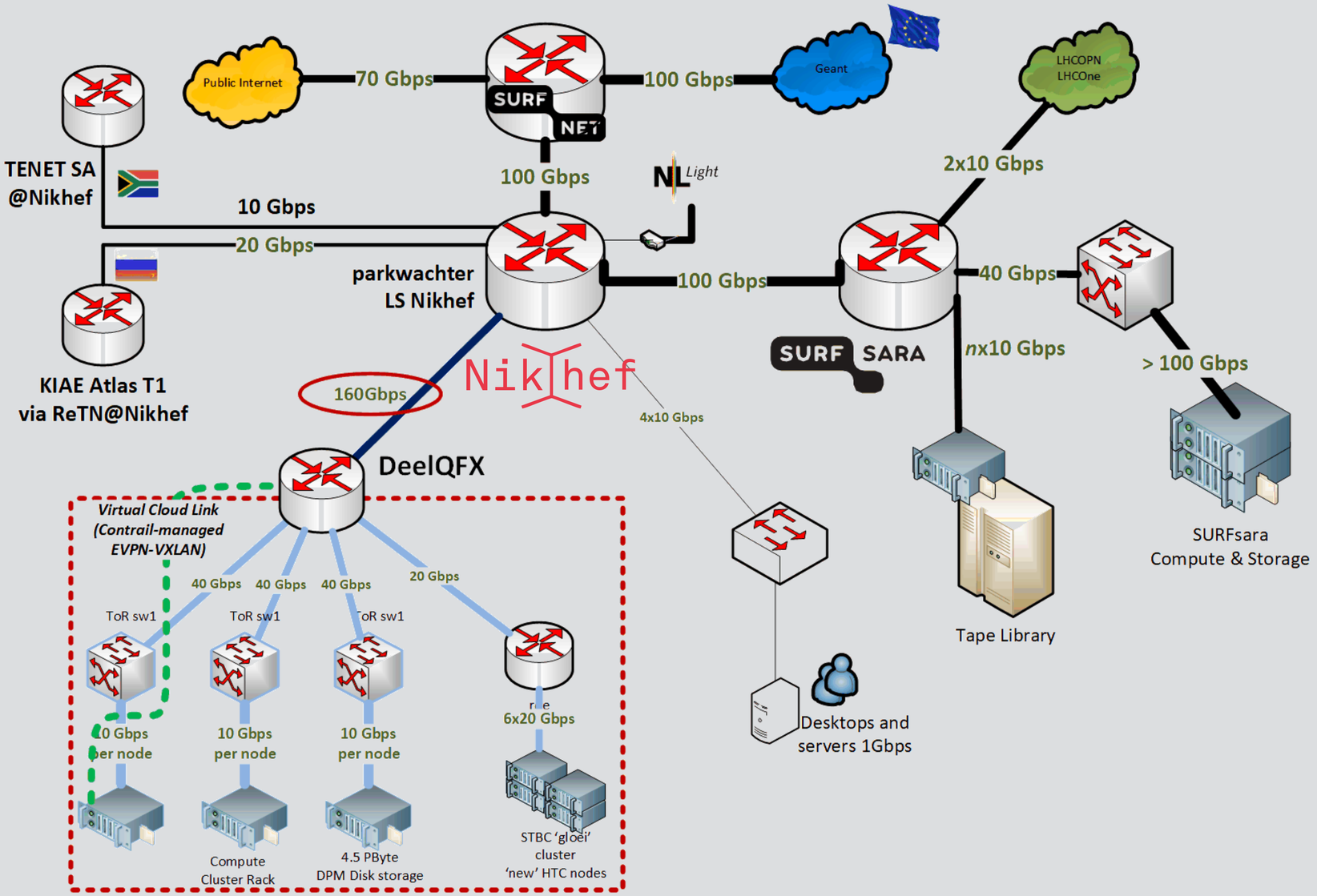
A global system of systems



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

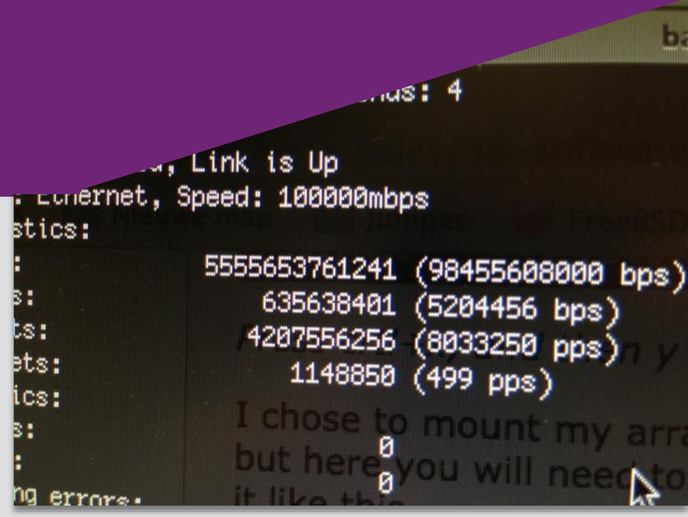
Key figures

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

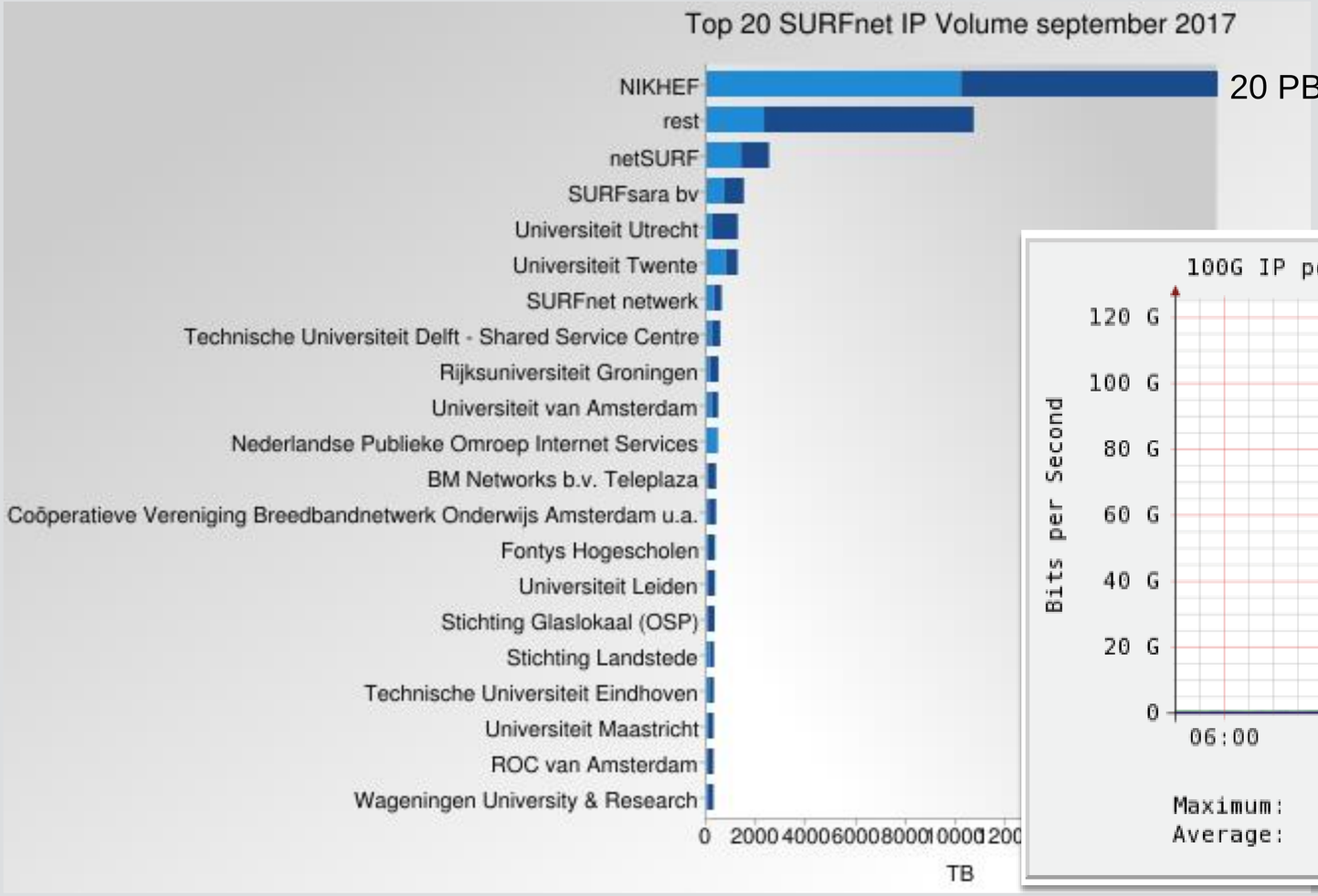
Experimental 'playground' facilities

for trials with network, CPU and storage vendors, and Nikhef capabilities

just do it ...

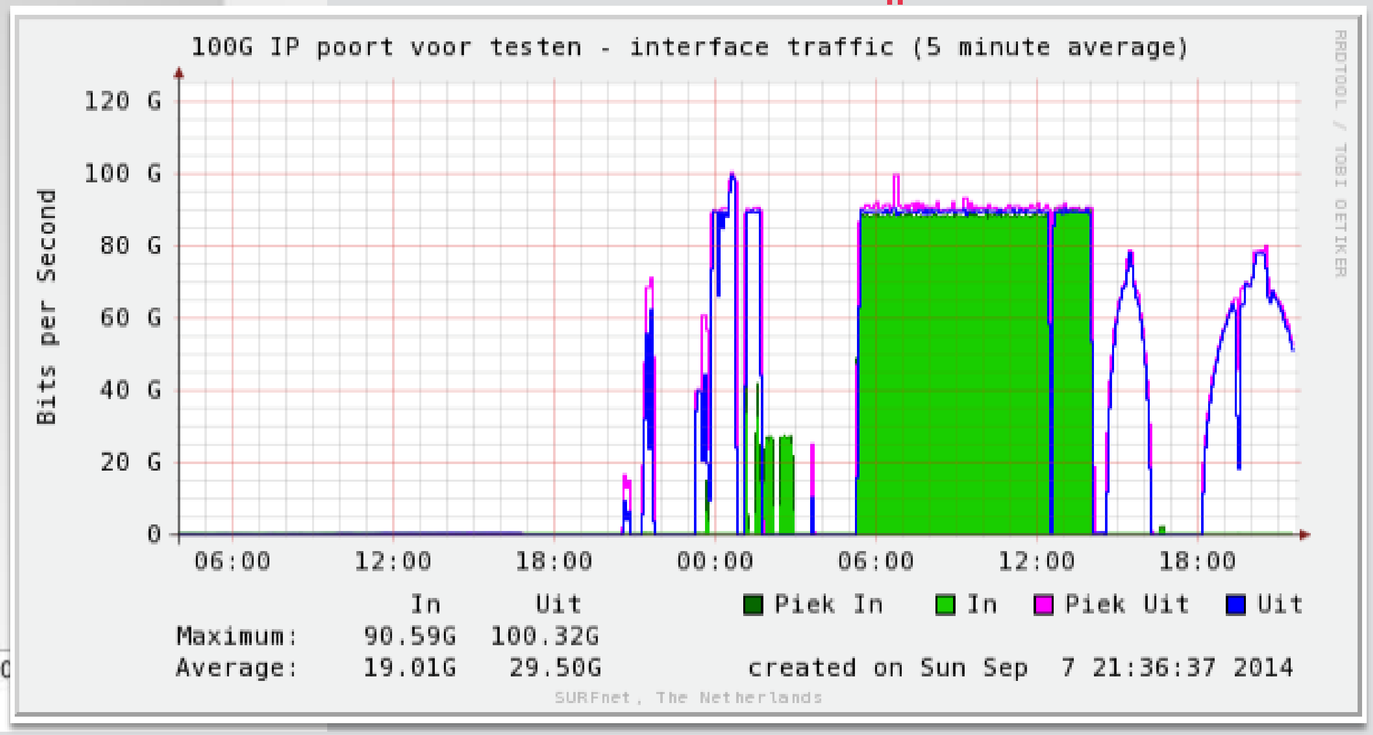


Nikhef fraction of total SURFnet (NL Academic) traffic, September 2017



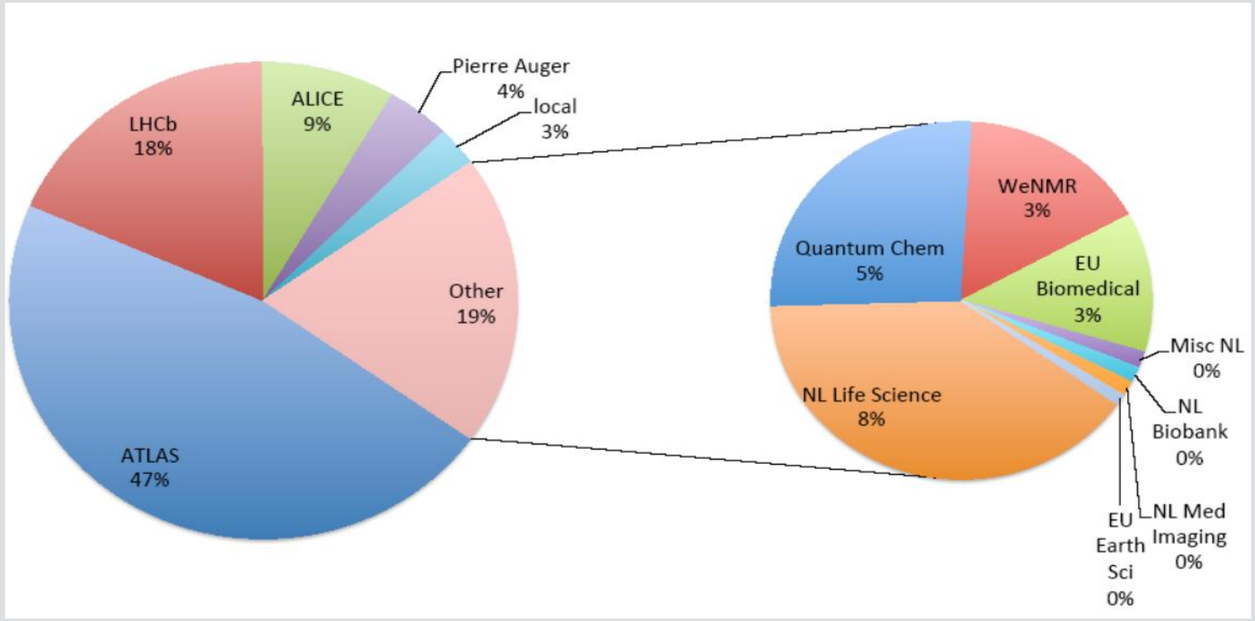
20 PByte/mo

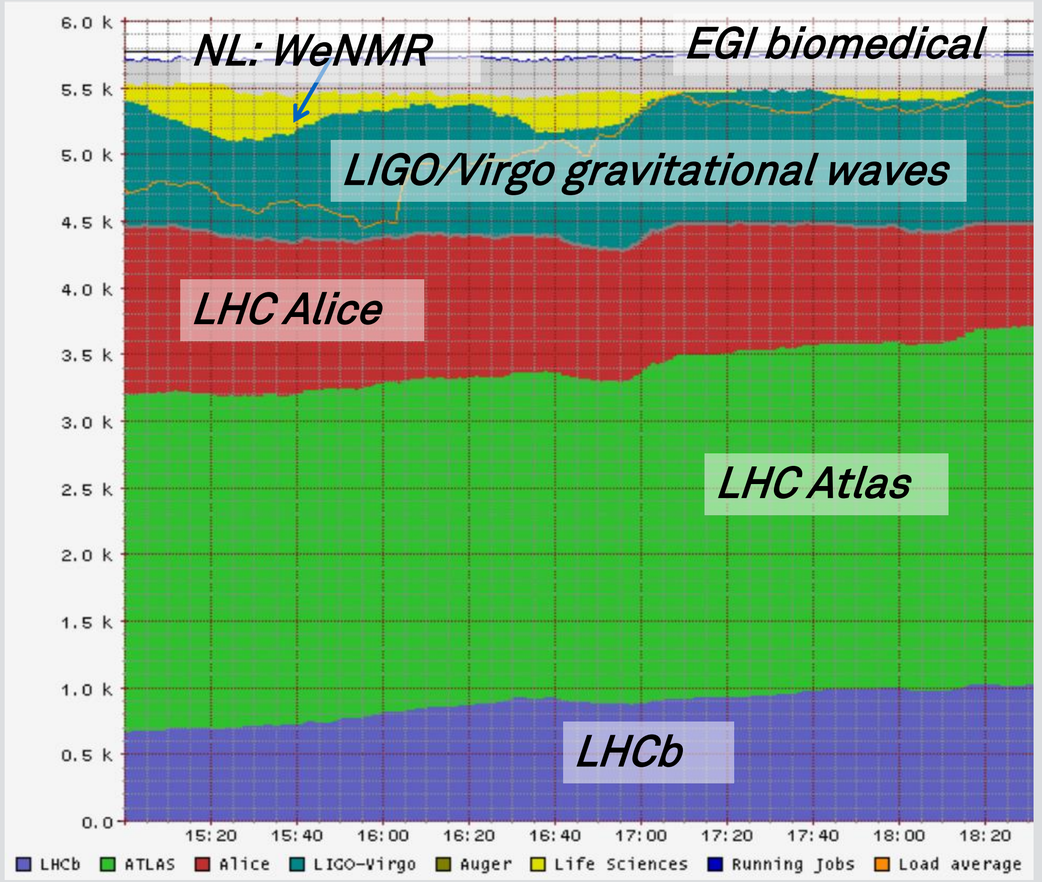
Nikhef → SURFnet → RUG-CIT||UvA – validation in 2015



and keep it efficient by joining up

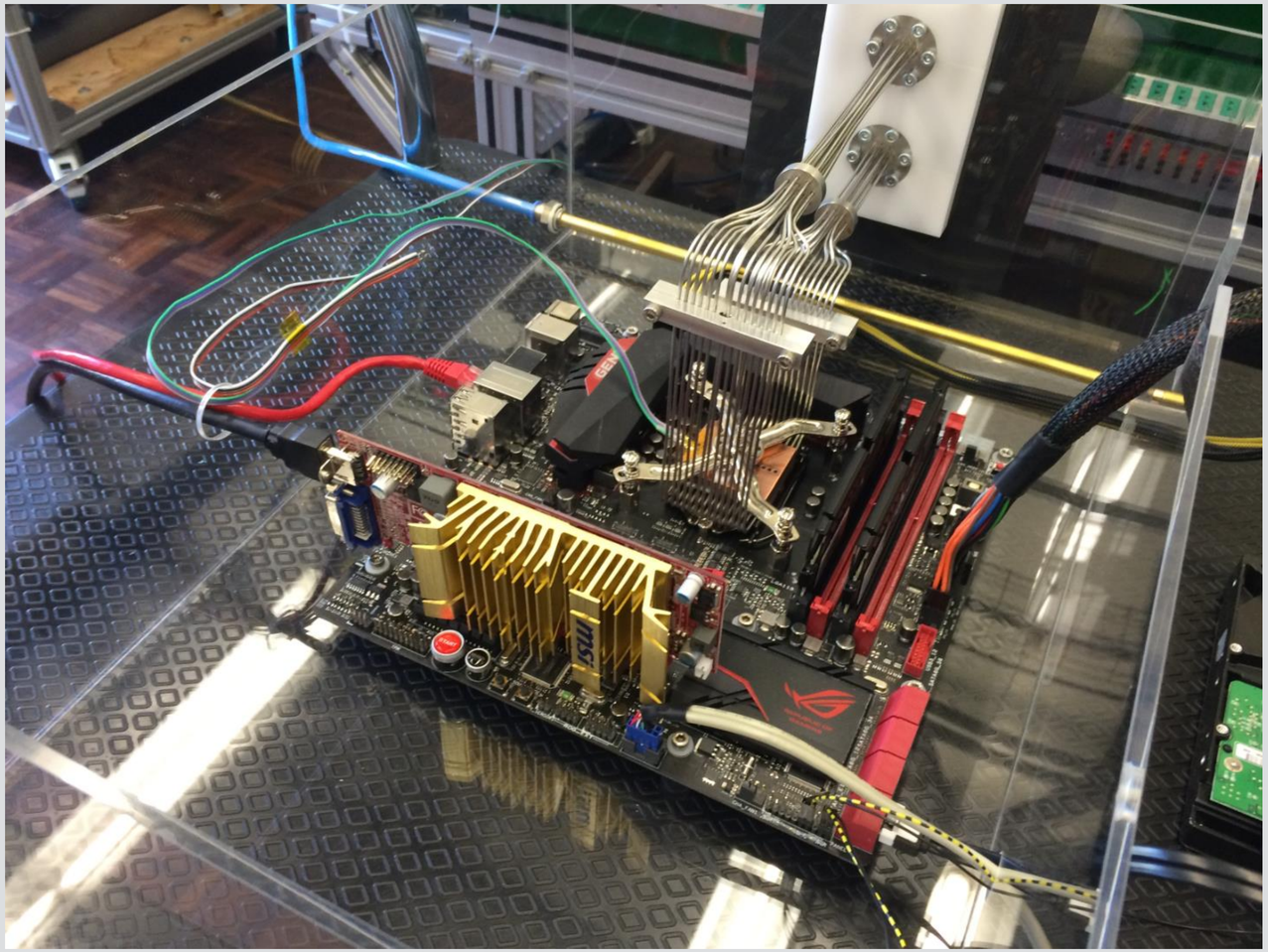
>98% utilisation, >90% efficiency





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

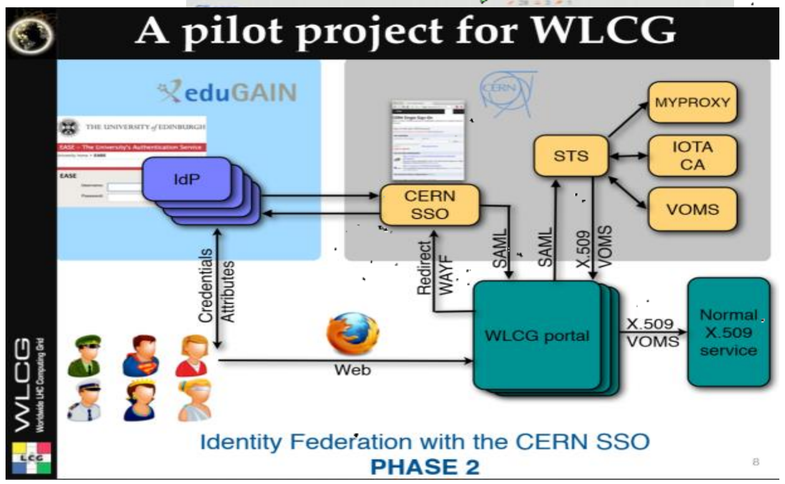
eduGAIN

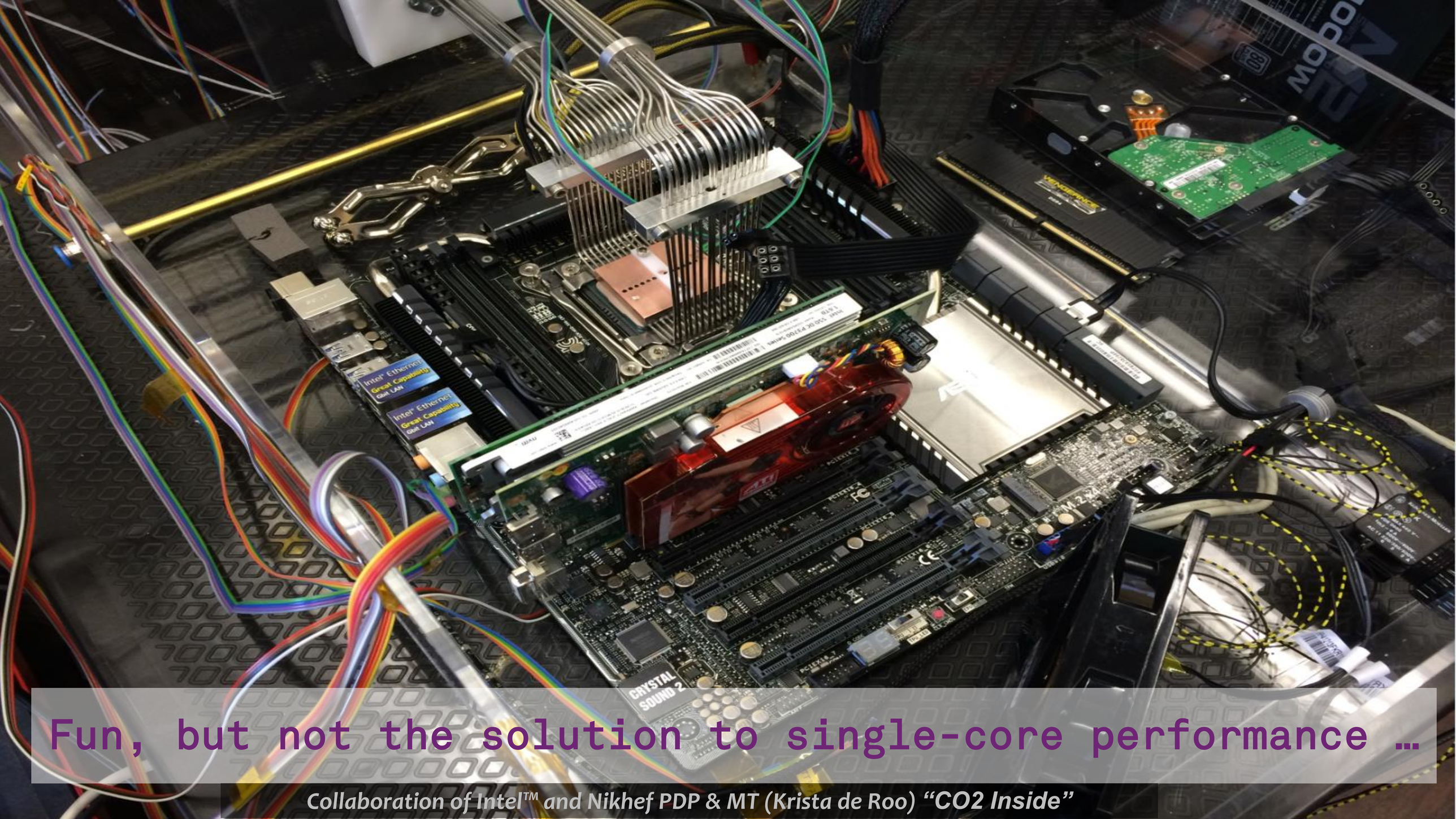
CILogon Service

RCauth.eu

IGTF
Interoperable Global Trust Federation
AP | EU | TAG

wLCG FIM4R pilot





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

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