Welcome

to the

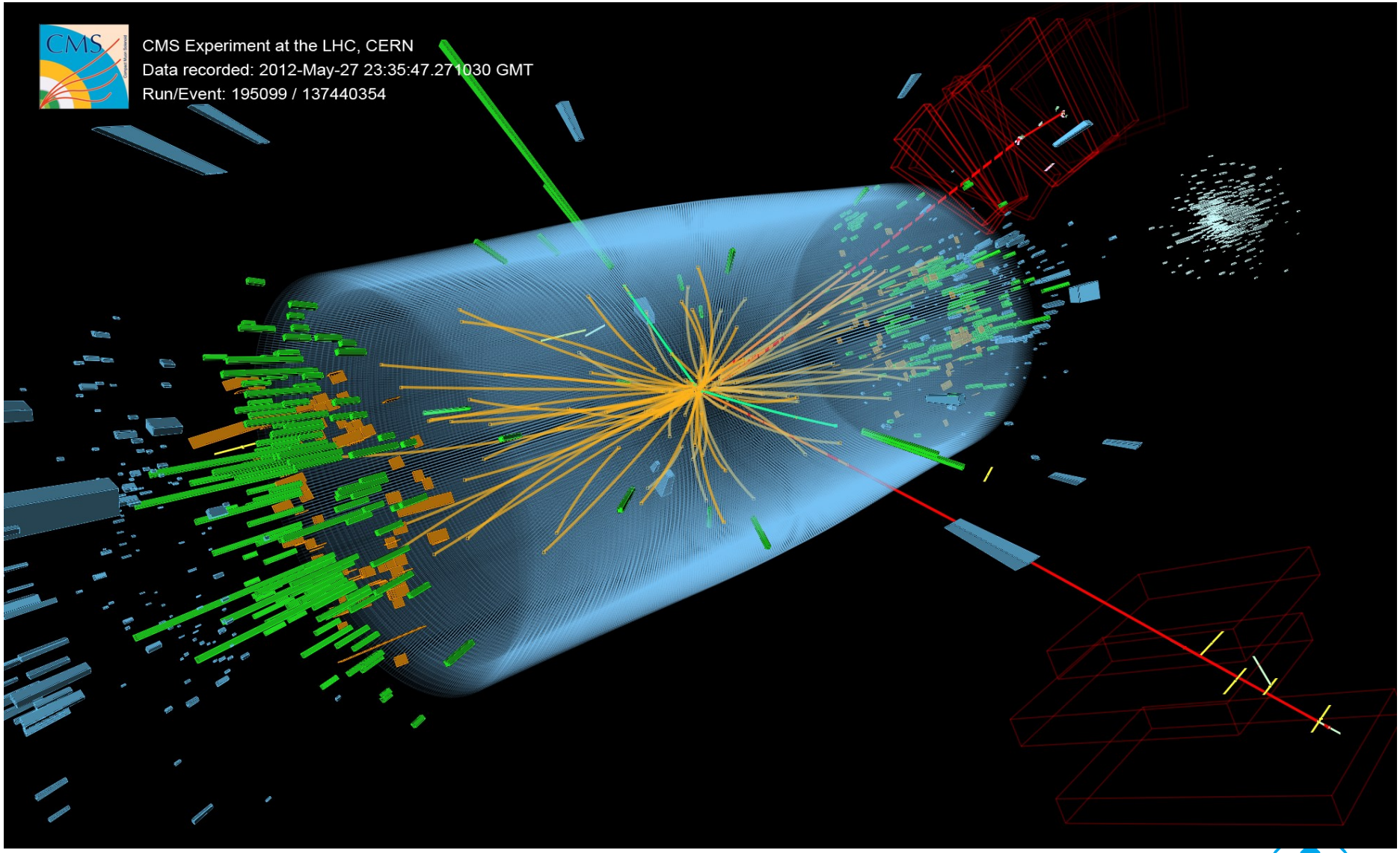
HTCondor Workshop

Volker Guelzow
DESY
Hamburg, June 6th, 2017

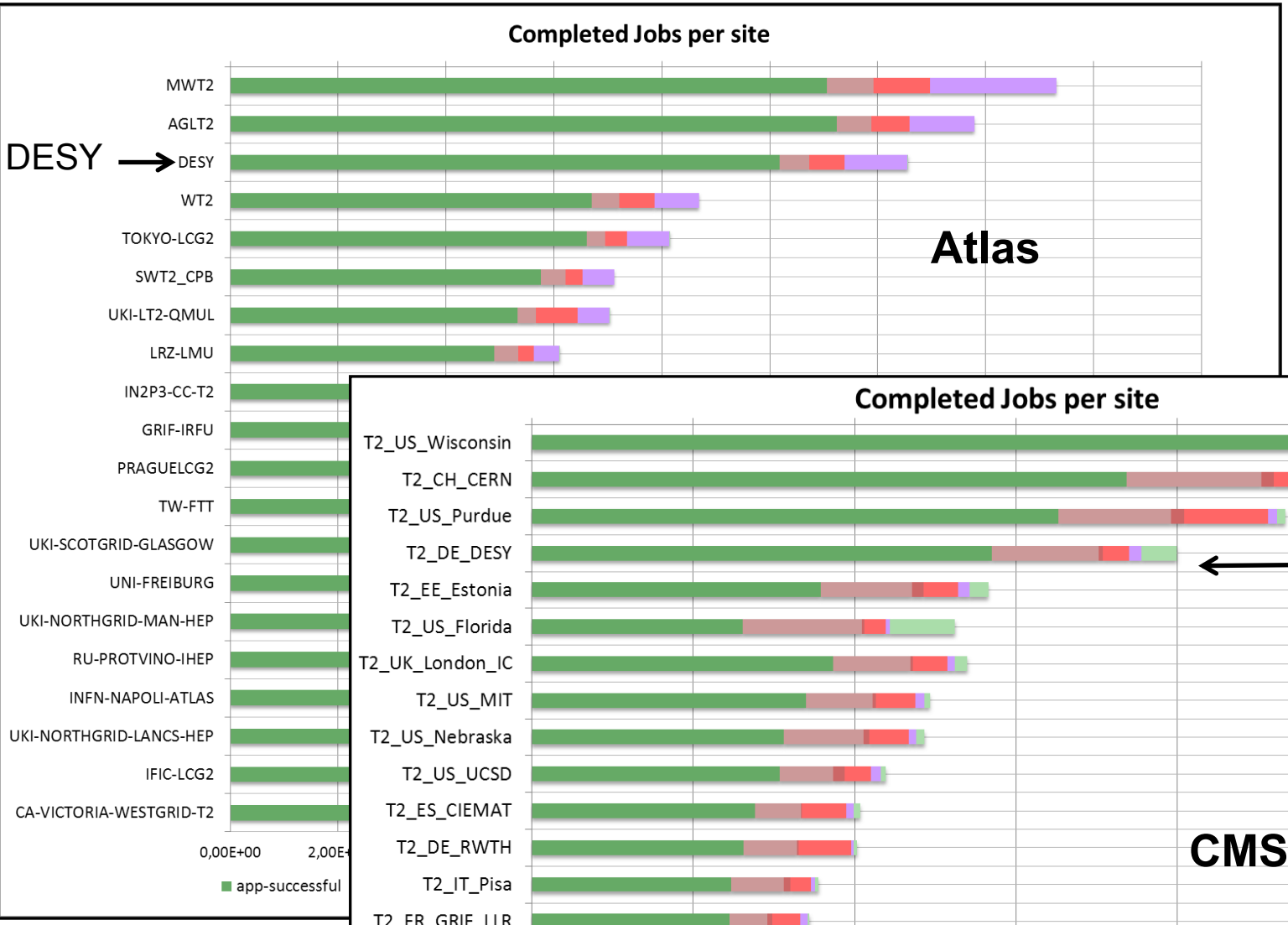
HELMHOLTZ GEMEINSCHAFT

DESY

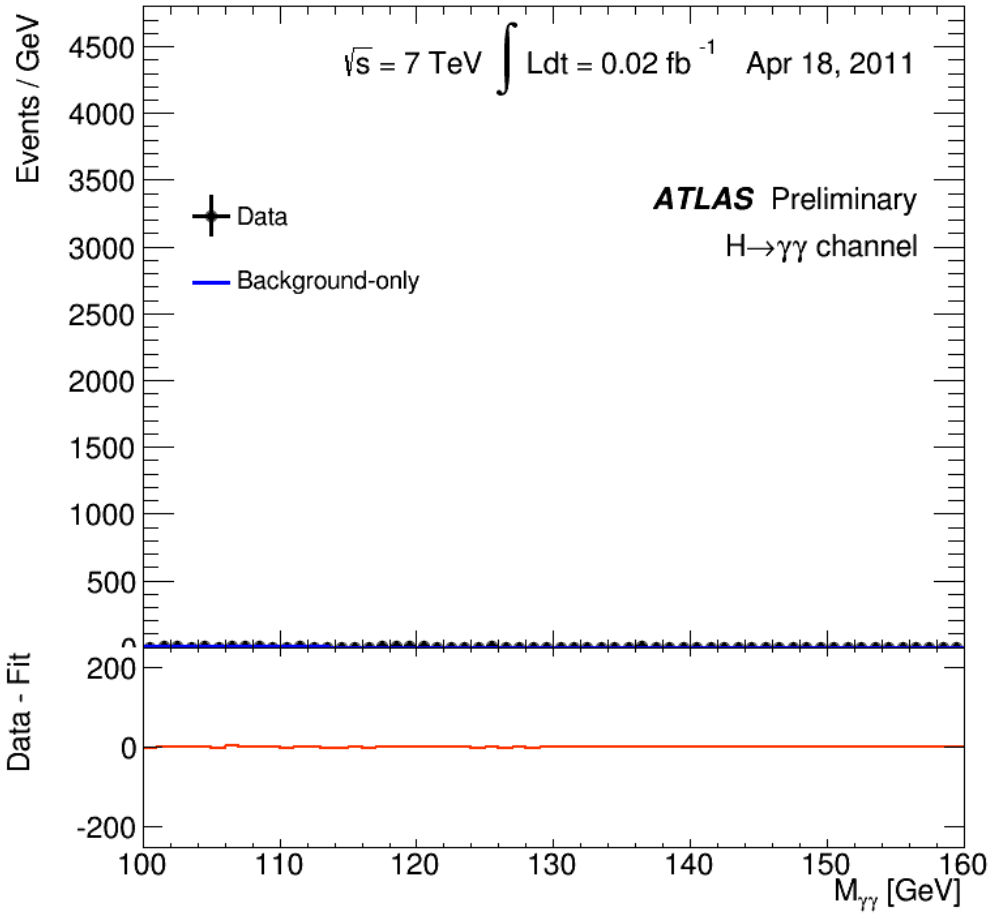
Particle Physics needs

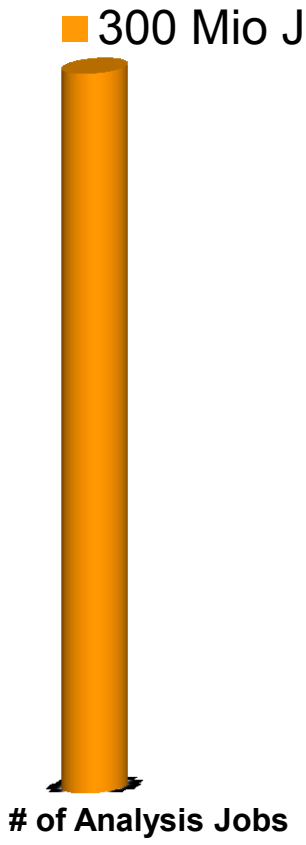


Completed WLCG Jobs per Tier-2 Site



Higgs Discovery

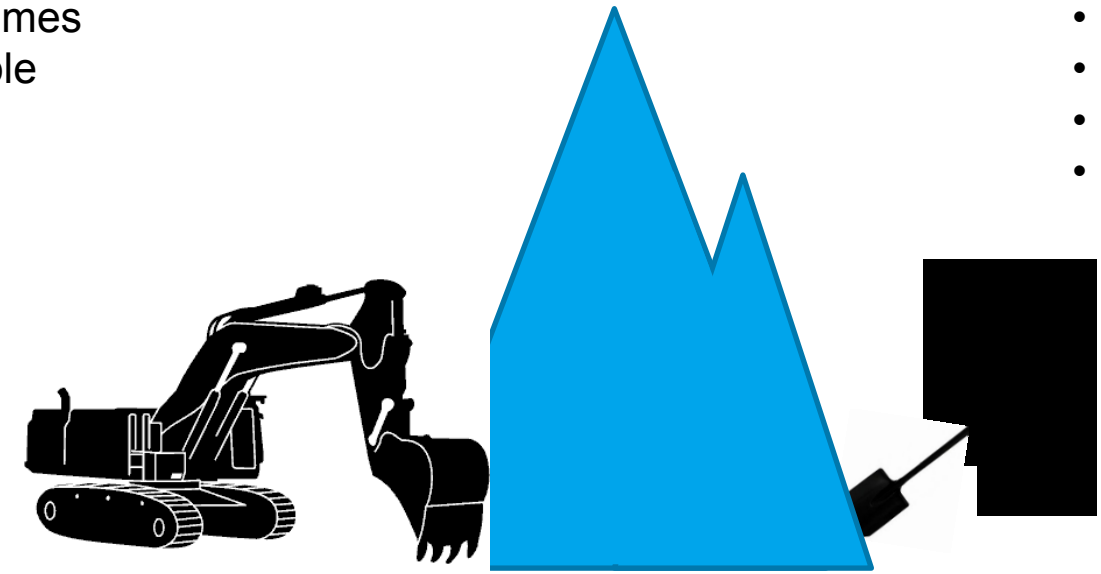




Why the NAF? - Grid versus NAF

The Grid World
- batch
- centralized
- large volumes
- less flexible

The NAF World
- interactive
  - i.e. PROOF
- flexible
- fast turnaround
- final analysis
- user driven



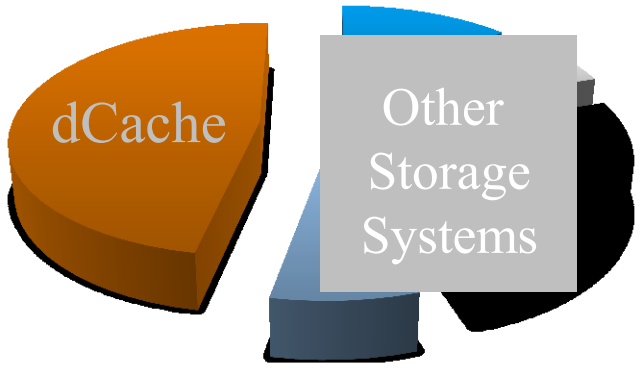
LHC Data – the treasure

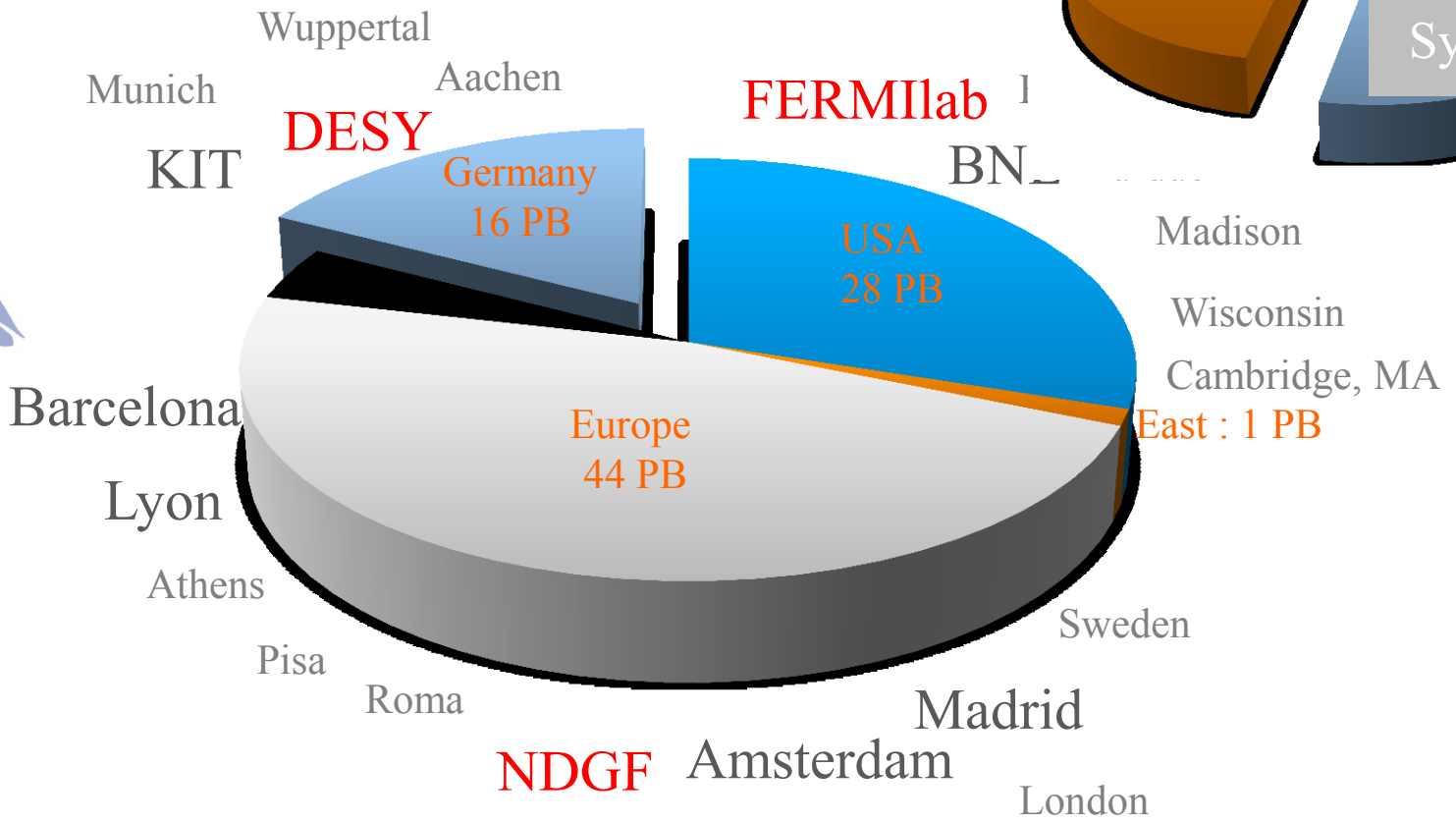
Worldwide User Community

German User Community

dCache, The Deployment

- 94 PB in total WLCG
- 8 Tier 1's, 60 Tier 2's



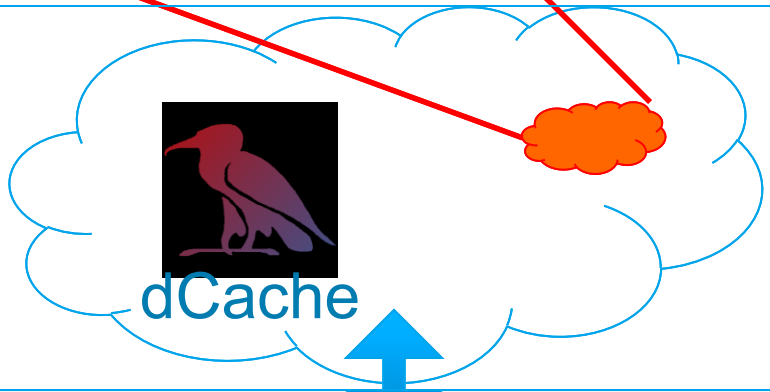


Contact : Patrick Fuhrmann @ DESY

dCache – OwnCloud
Data Management

WEB 2.0

Unlimited hierarchical
Storage Space
NFS 4.1
CDMI



SSD'S

Spinning Disks

Tape, Blue-ray …

LHC (from Cern RRB 2016-129)

Resource Request from Experiments

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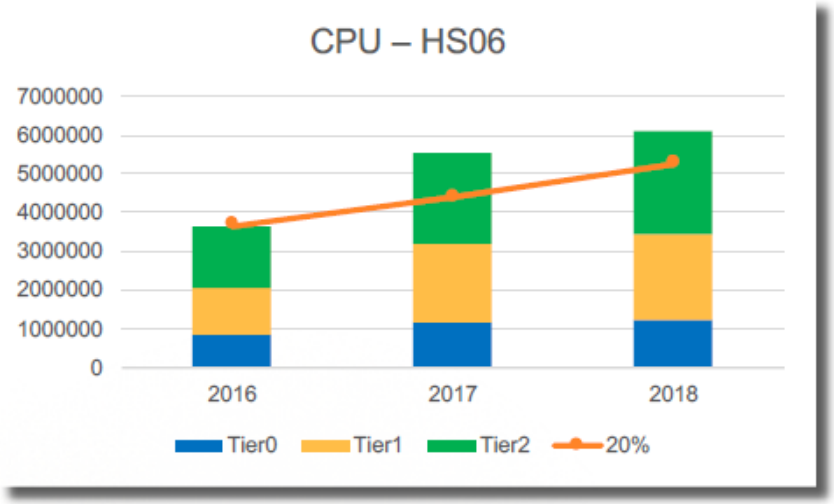
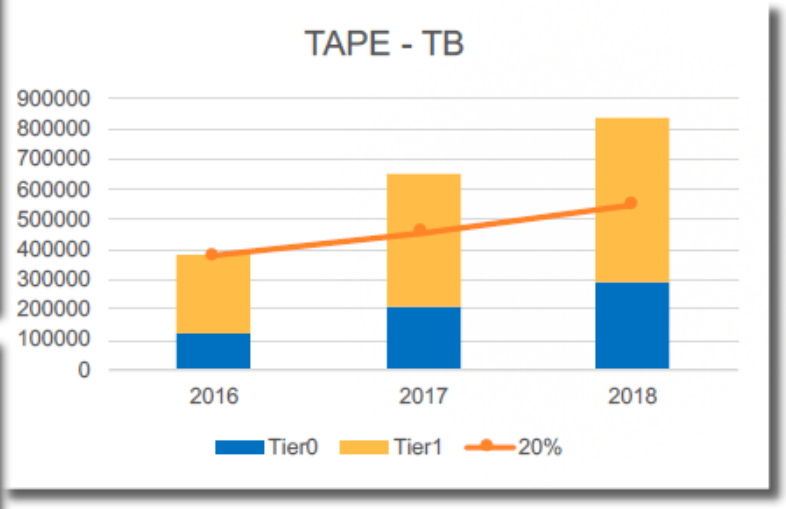
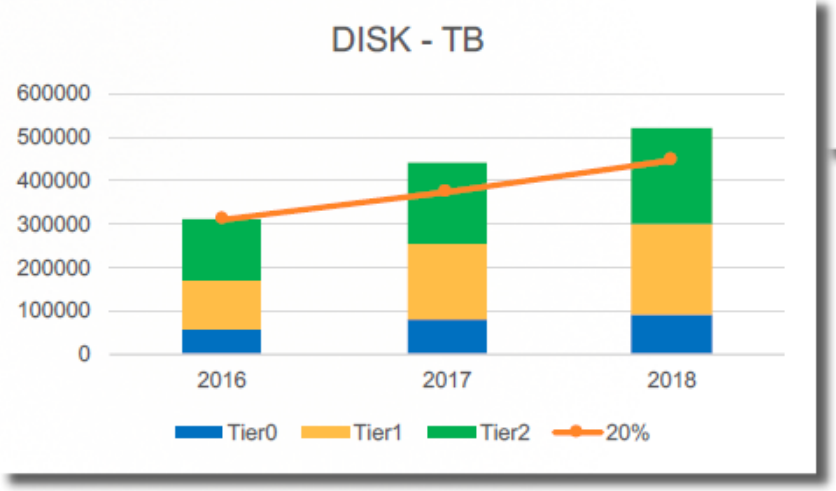
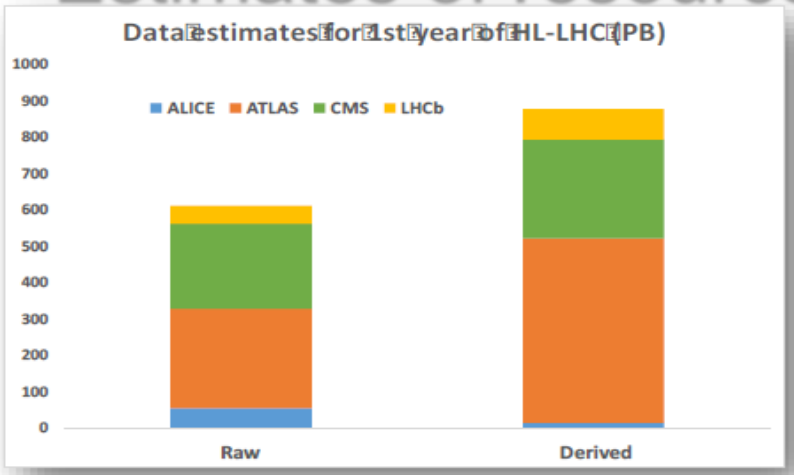
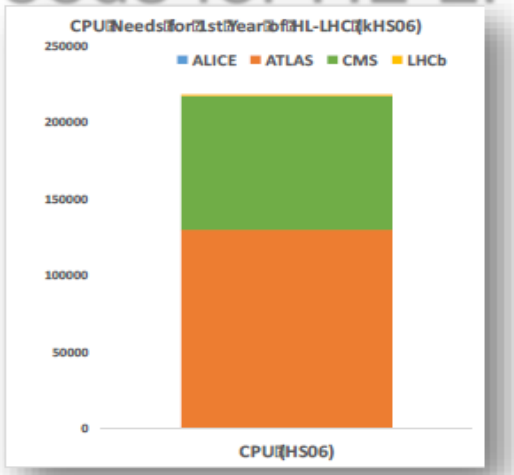






Estimates of resource needs for HL-LHC





Data:
- Raw 2016: 50 PB → 2027: 600 PB
- Derived (1 copy): 2016: 80 PB → 2027: 900 PB

CPU:
- x60 from 2016

Source: Ian Bird (CERN)

Technology at ~20%/year will bring x6-10 in 10-11 years

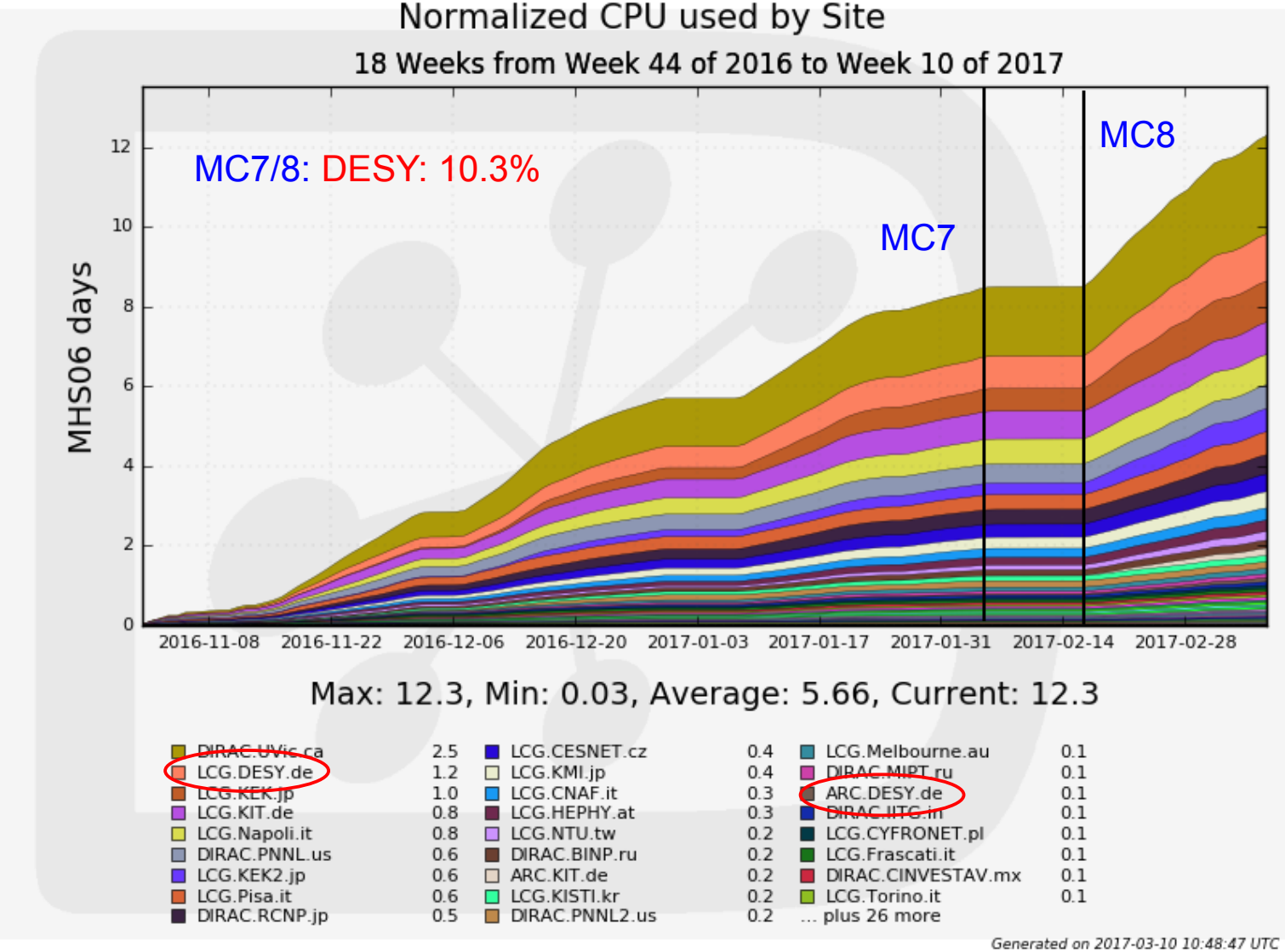
- Simple model based on today's computing models, but with expected HL-LHC operating parameters (pile-up, trigger rates, etc.)
- At least x10 above what is realistic to expect from technology with reasonably constant cost

CERN | WLCG

25 October 2016 Ian Bird 27

DESY

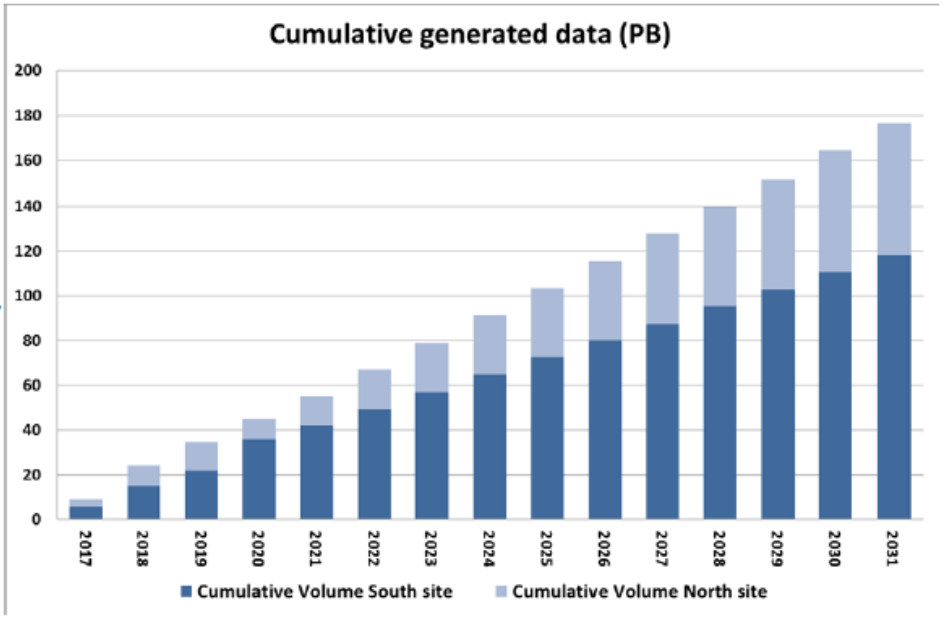
Belle II: Computing @ DESY



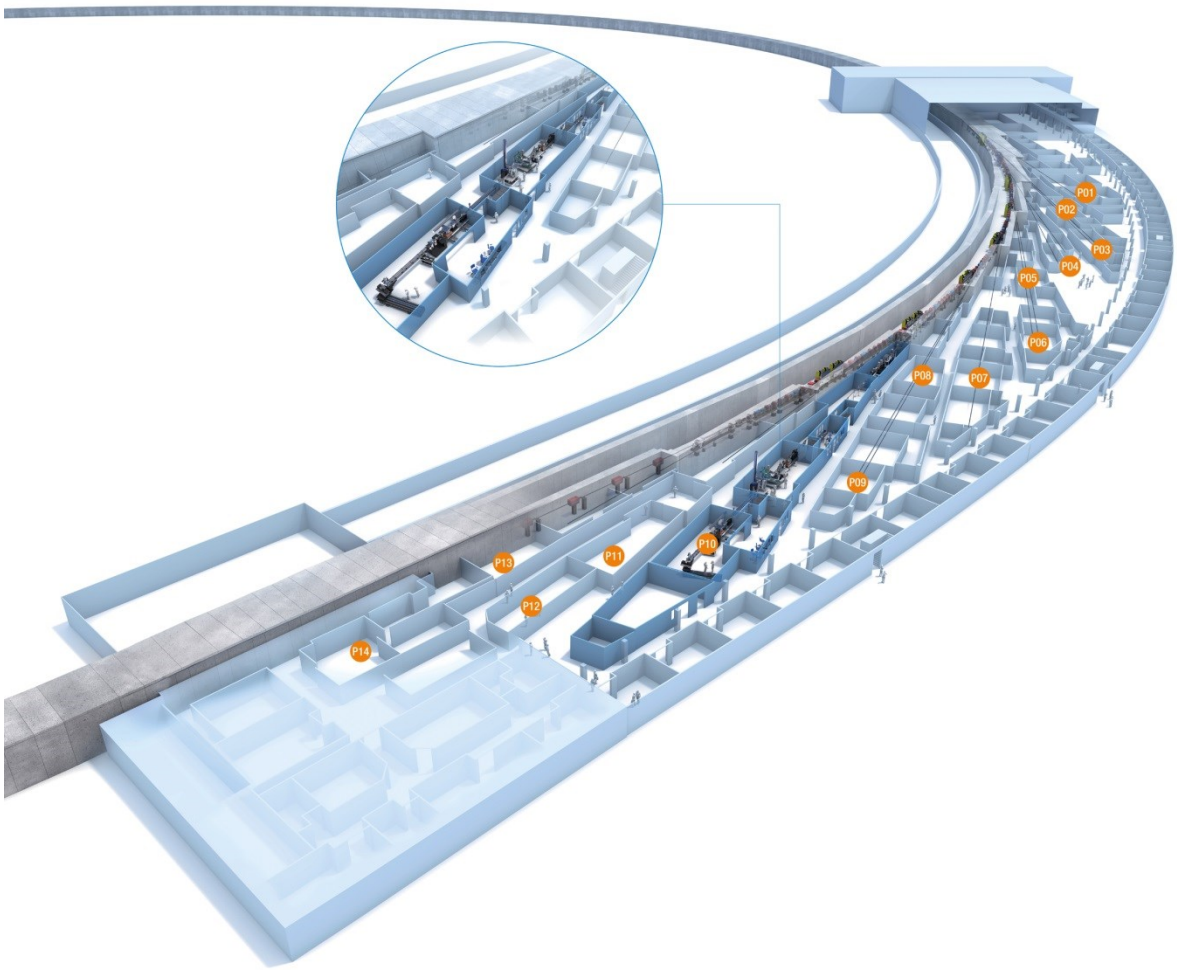
CTA data volume

- Data to be archived for 30 years of operation + 10 years
- One reprocessing per year (2 versions kept)
- Resulting new data per year
  - Raw data: 4 PB/y
  - Processed data: 4 PB/y
  - Monte-Carlo data: 20 PB

  => 12 PB/year

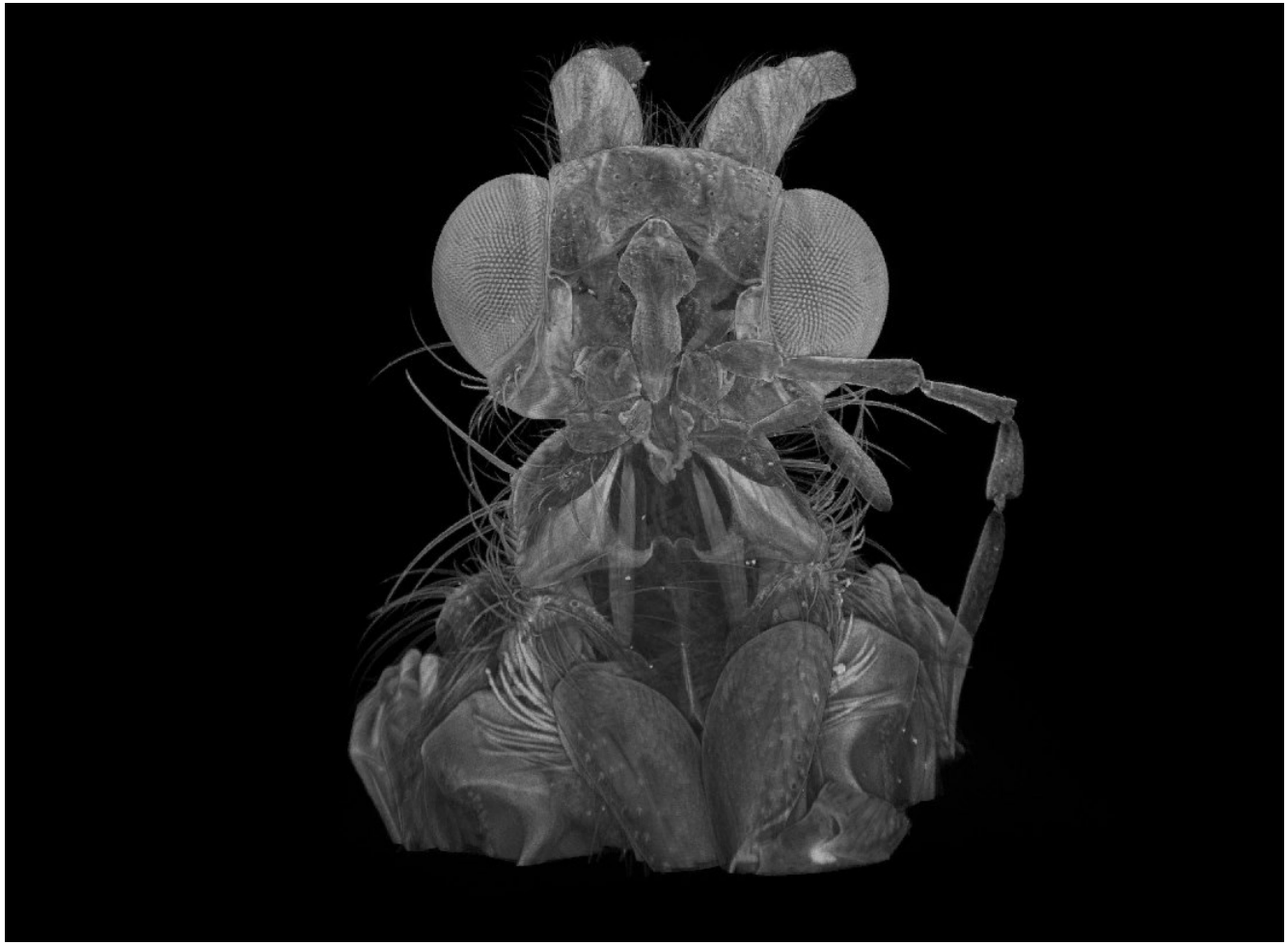


Data Requirements from Photon Science @ DESY



Research @ PETRA III

Köcherfliege (*Limnephilus flacivornis*) Kopf + Thorax



Courtesy:
Dr. F. Beckmann

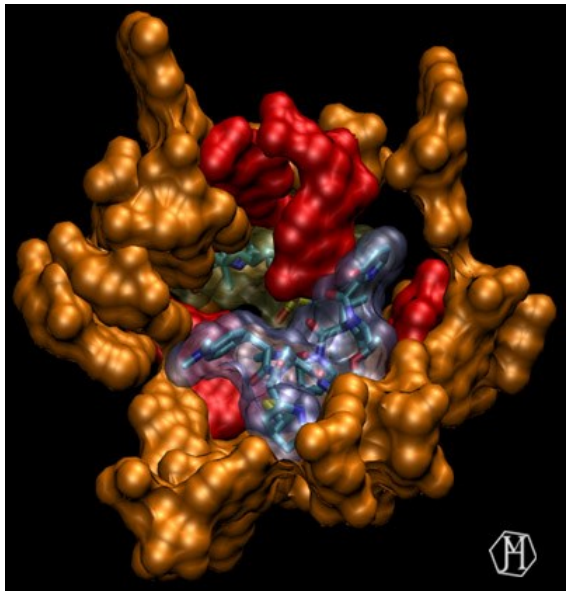
Helmholtz-Zentrum Geesthacht
Centre for Materials and Coastal Research

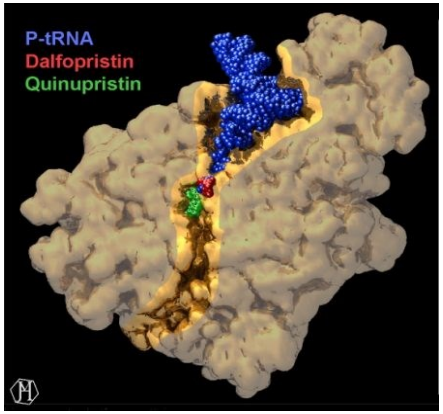
Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

Investigation of a van Gogh painting

Other examples

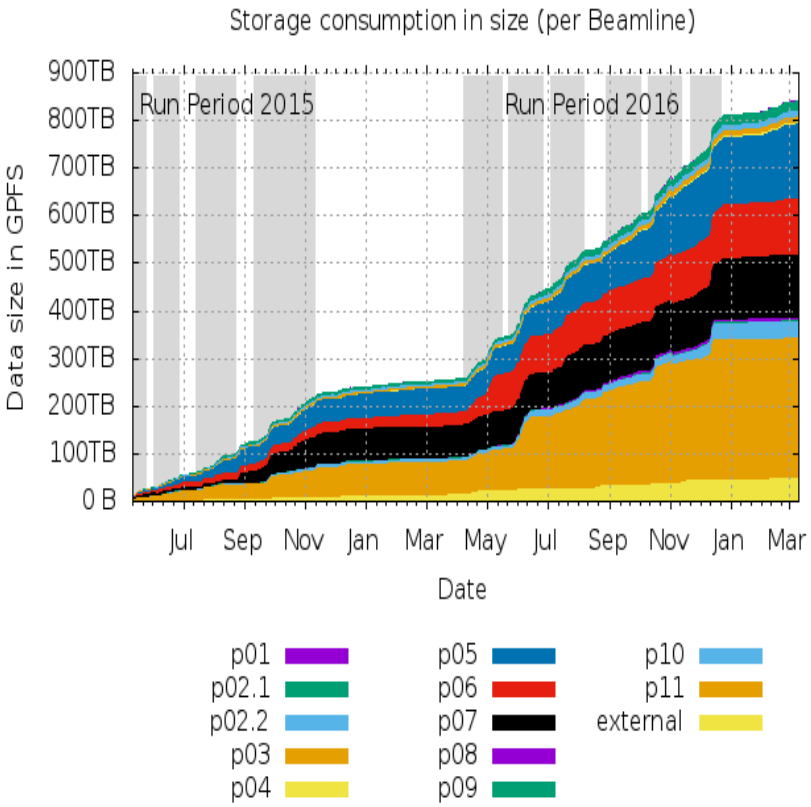
- 3D-time dependent
- Pattern recognition
- Fast image analyis (f.i. through neural networks)
- Virtual reality (Cave)

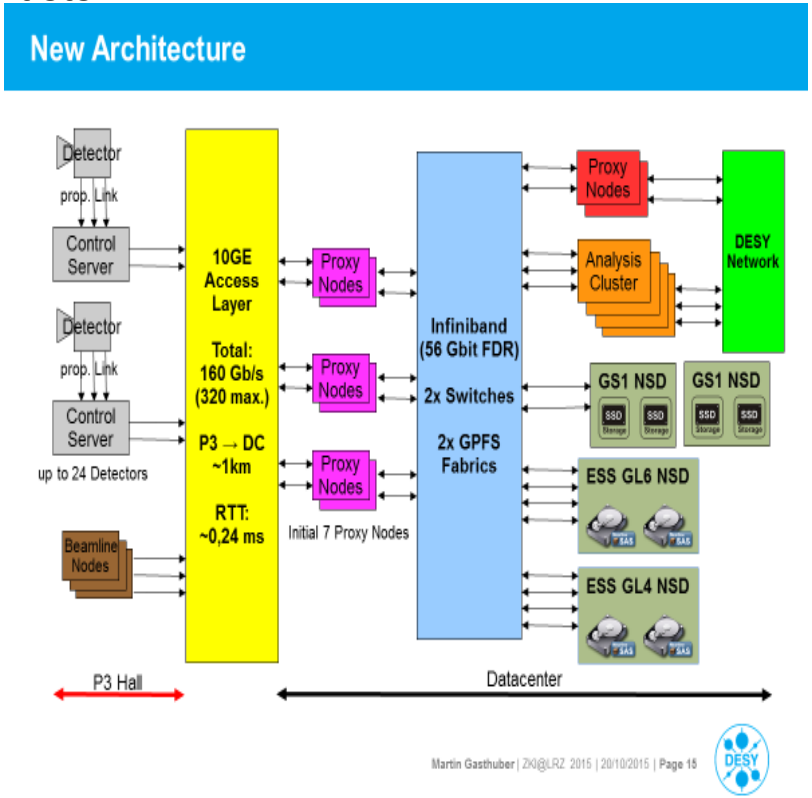




Photon Science – computing & storage @DESY

- started in 2015 with a new architecture & system for Petra III data
  - based on HPC technologies – InfiniBand, Nodes, GPFS
  - proven to be successful in 2015 and 2016 data taking and analysis – delivers all expectations and well adopted by scientists





HiDRA

•Problem:

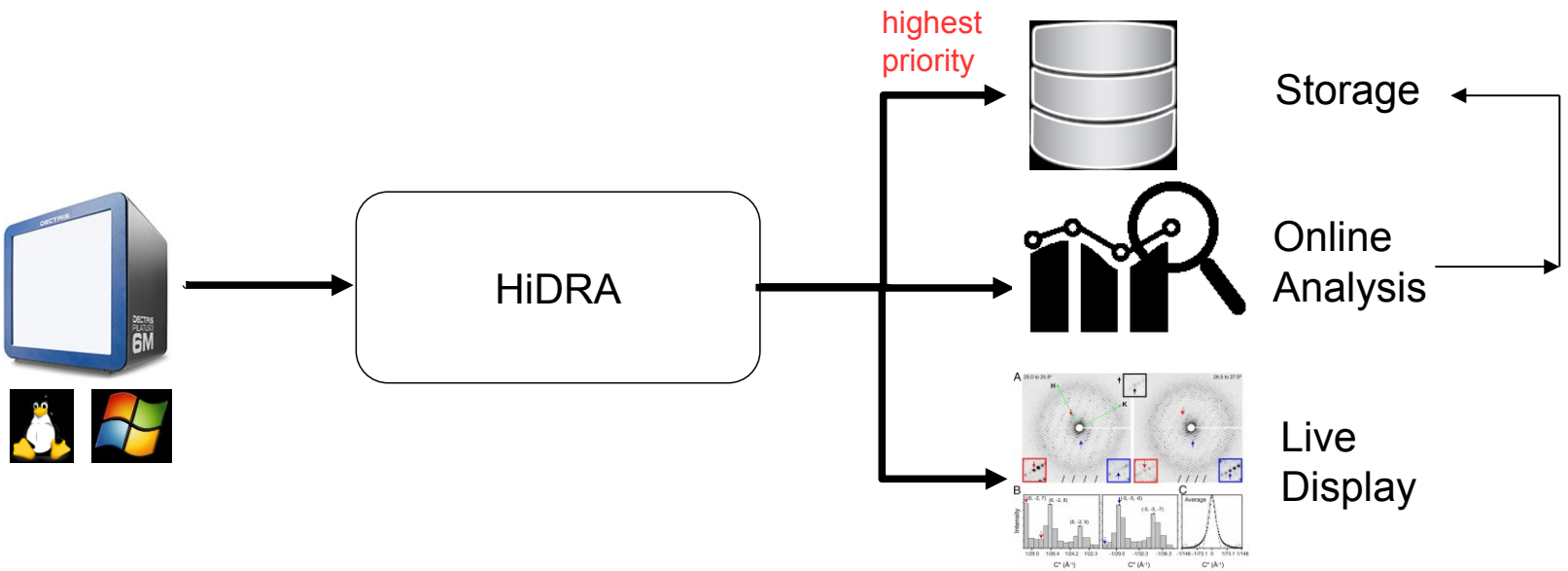
–data has to be drained from the detectors fast enough

–(>30Gb/sec)

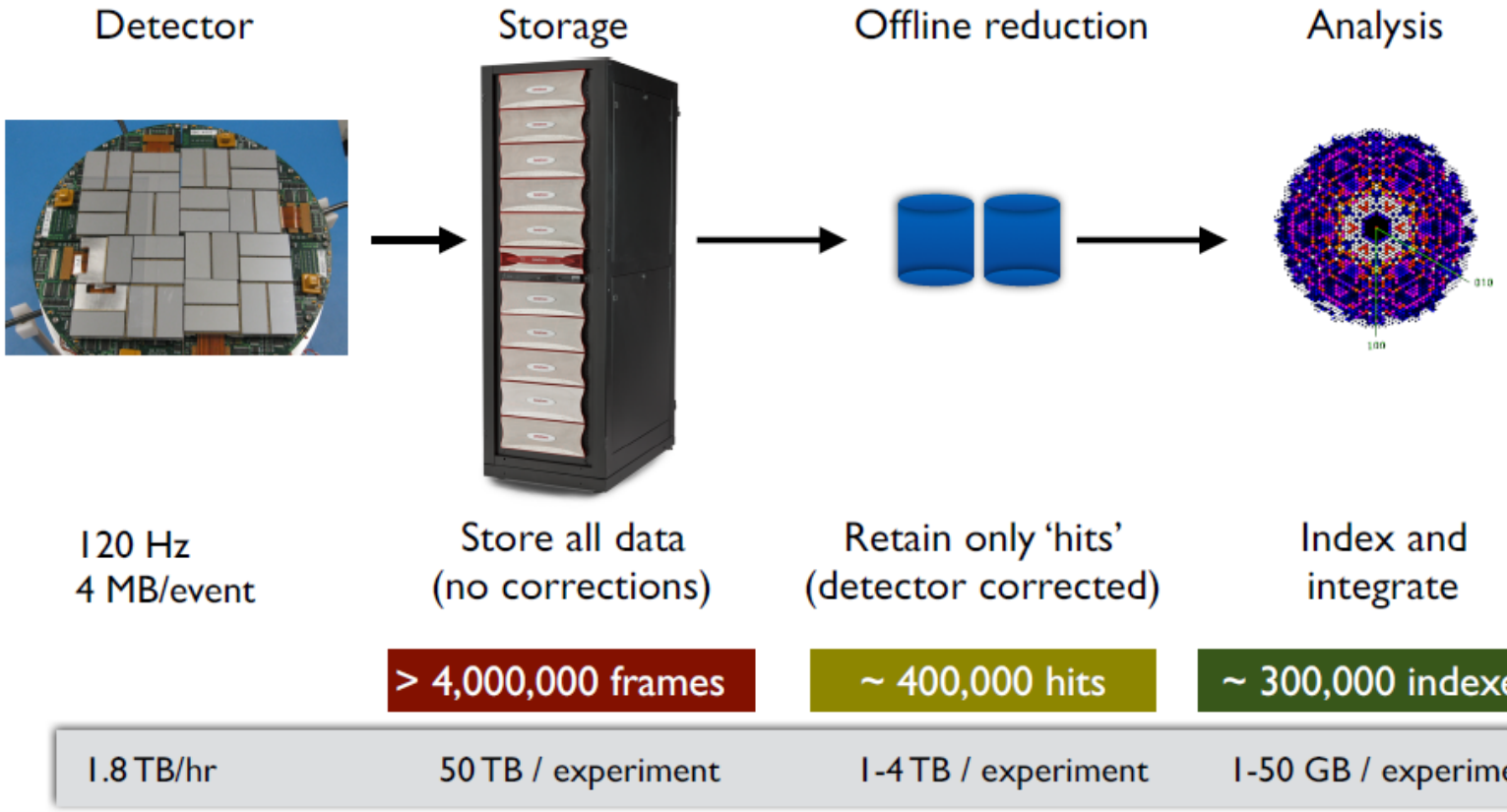
–experimental conditions have to be monitored and analyzed in close to real time to prevent the collection of unfavorable data, which also helps with preserving the valuable sample (online analysis)

•HiDRA is a generic tool set for high performance data multiplexing with different qualities of service based on Python and ZeroMQ

•**expanded to FLASH, NANOlab, CSSB,…**



Data processing is an exercise in data management and reduction



Automated high throughput data processing is essential but hard as hit rates are high, vetoing is non obvious, and retention of full frame data is required for analysis

CFEL SCIENCE

From Anton Barty, CFeL

DESY

Introduction: basic data

- ~ 10.000 users
- ~ 40.000 IP-Adresses
- 40 Gb/s at the CC, 1/10 GE on campus
- 25 PB Disk
- Tapes
- > 35.000 cores
- 800 kW power -> upgrade to 1.5 MW
- 2x5 Gb/s to XWiN + 3 x10 GE VPN (2 to Zn + 1 LHCone)
- HPC-Systems in Hamburg&Zeuthen

Software investment

- We need to invest more into software
- We need more collaboration on software & “methods”
- There are some (funded) activities in some countries
- HEP put HSF in place, recognising software as a crucial area
- Need to engage effort globally & coherently for this
- NB: Software and infrastructure must be treated together – the separation is a source of inefficiency

Final

No Computing - no Science