The Belle II Computing System

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On behalf of the Belle II computing group
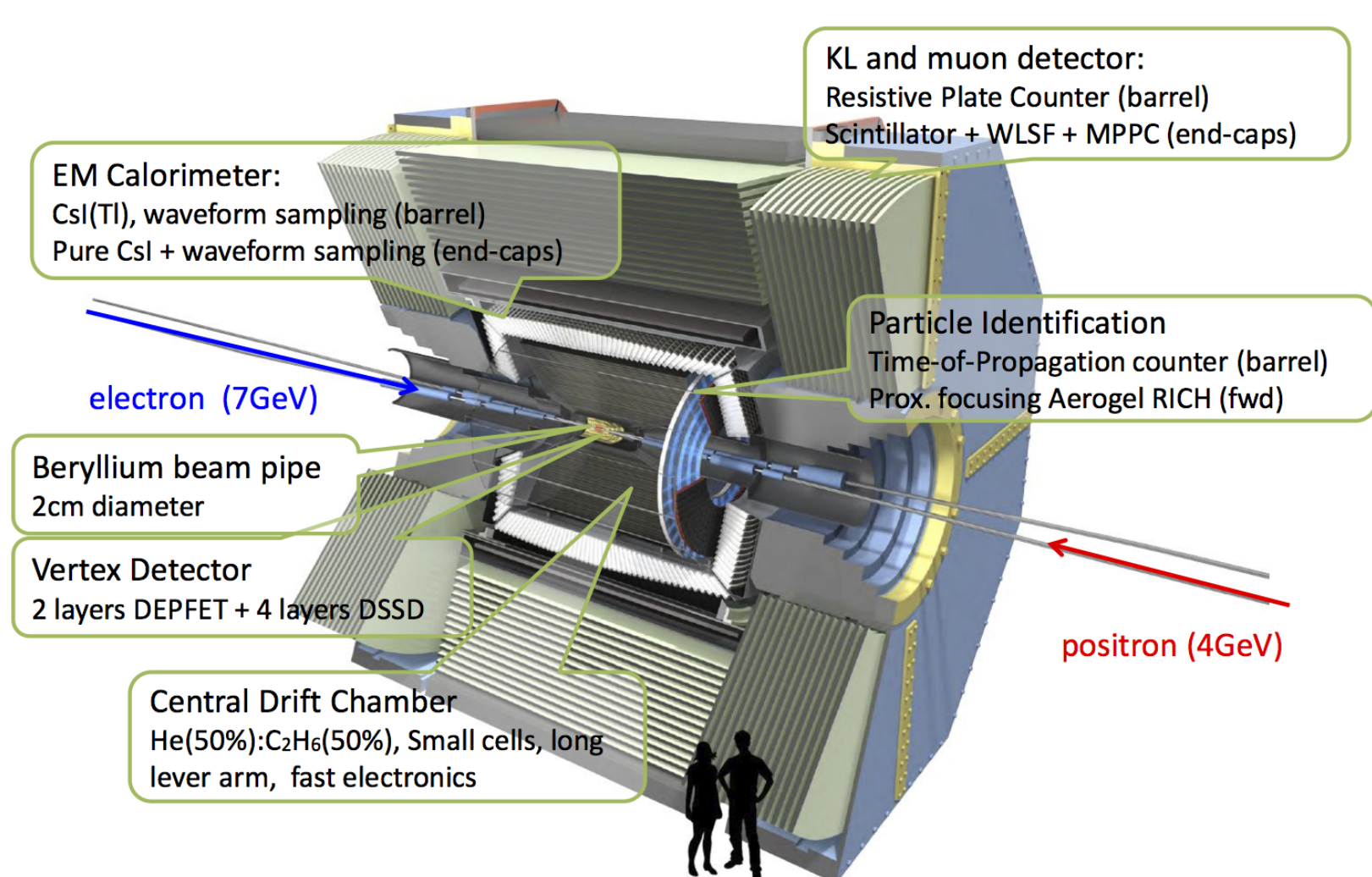
Cinvestav

The Belle II experiment

- e^+e^- collider, with $\sqrt{s} = 10.58$ GeV.
- The full physics run will start at the end of 2018.
- Target integrated luminosity: 50 ab^{-1}.
- The ammount of data expected is 50 times larger than the produced by previous B-factories (Belle and BaBar).

KL and muon detector:
Resistive Plate Counter (barrel)
Scintilator + WLSF + MPPC (end-caps)

EM Calorimeter:
CsI(Tl), waveform sampling (barrel)
Pure CsI + waveform sampling (end-caps)

Particle Identification
Time-of-Propagation counter (barrel)
Prox. focusing Aerogel RICH (fwd)

electron (7GeV)

Beryllium beam pipe
2cm diameter

Vertex Detector
2 layers DEPFET + 4 layers DSSD

positron (4GeV)

Central Drift Chamber
He(50%):C$_2$H$_6$(50%), Small cells, long lever arm, fast electronics
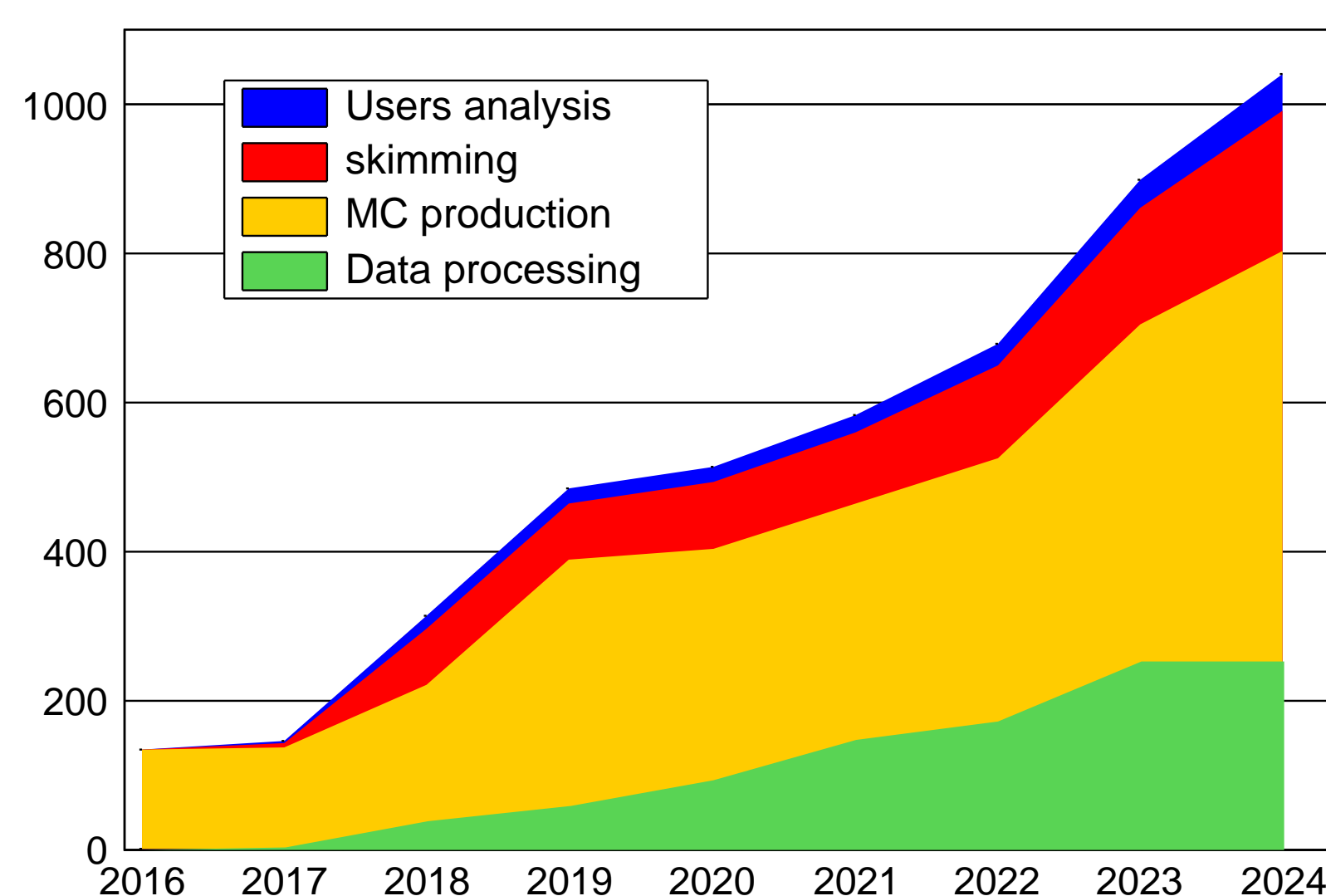
The Belle II detector.

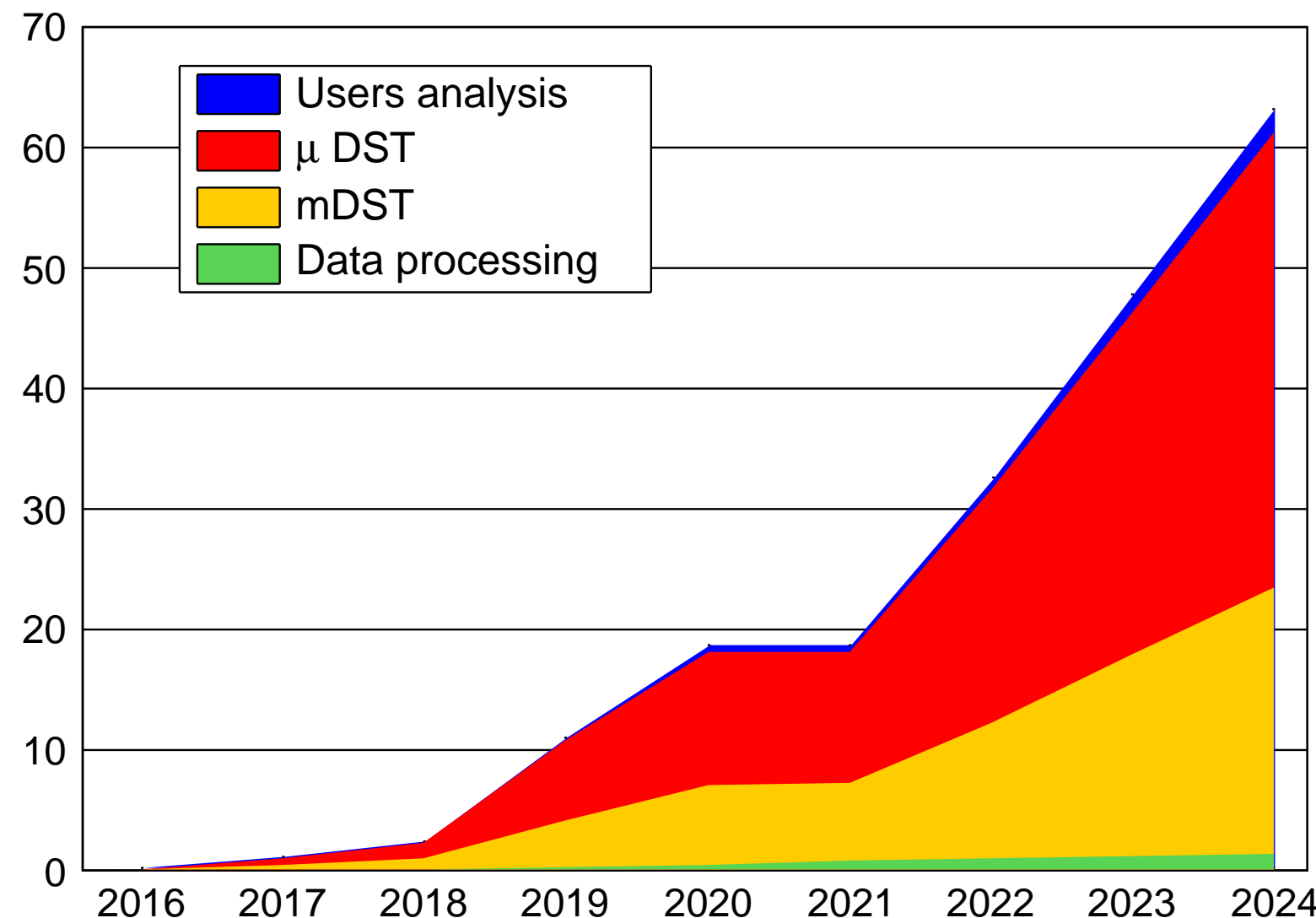## Overview of the required resources

To translate the collisions inside the Belle II experiment into physics results, the information obtained by each component of the detector should be stored and processed. Belle II is expected to produce tens of peta-bytes of real and simulated data per year.

In order to achieve the physics goals of the experiment, raw data must be processed without any delay to the experiment data acquisition. At the same time, simulated events for physics and detector performance studies must be produced. Based on these requirements, the hardware resources required are estimated.

CPU (kHEPSpec)

Legend: Users analysis, skimming, MC production, Data processing

Disk (PB)

Legend: Users analysis, μ DST, mDST, Data processing

Estimation of CPU and Disk required.

Computing model

The computing system plays a key role for the success of the experiment, managing the data of the events to be easily access and analyzed by the researchers.

In order to process these large-scale data and provide the physics results in a timely fashion, we adopt existing distributed computing technologies such as "GRID" and "Cloud", connecting the computing resources of collaborating institutes in the world via high speed networks. KEK will host the main center that is responsible for raw data processing / archiving.
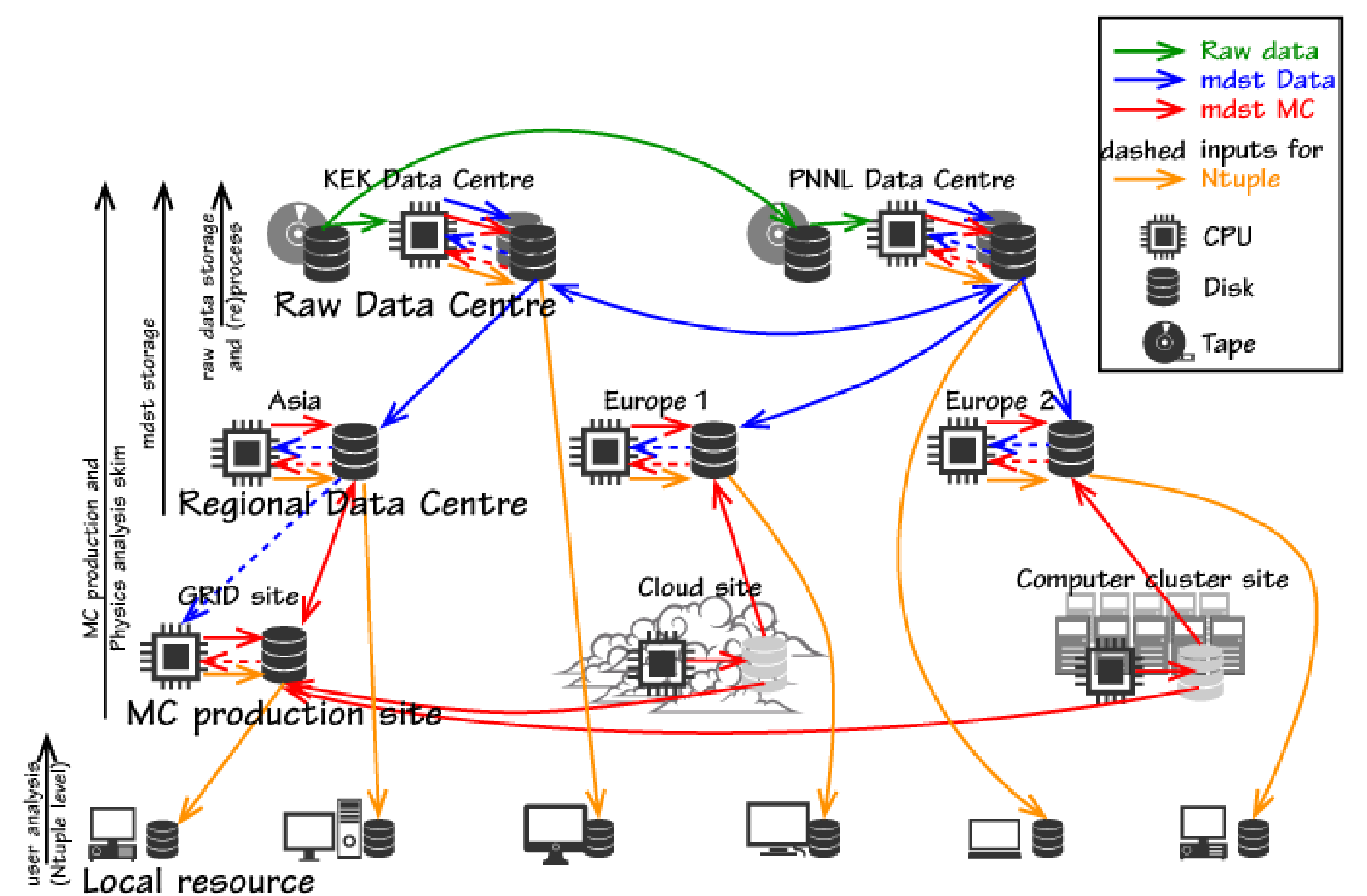
Each Grid site allows users to produce ntuples from skimmed datasets and takes care of the MC production, complemented by cloud computing facilities. Finally, users analyze ntuples on local resources.
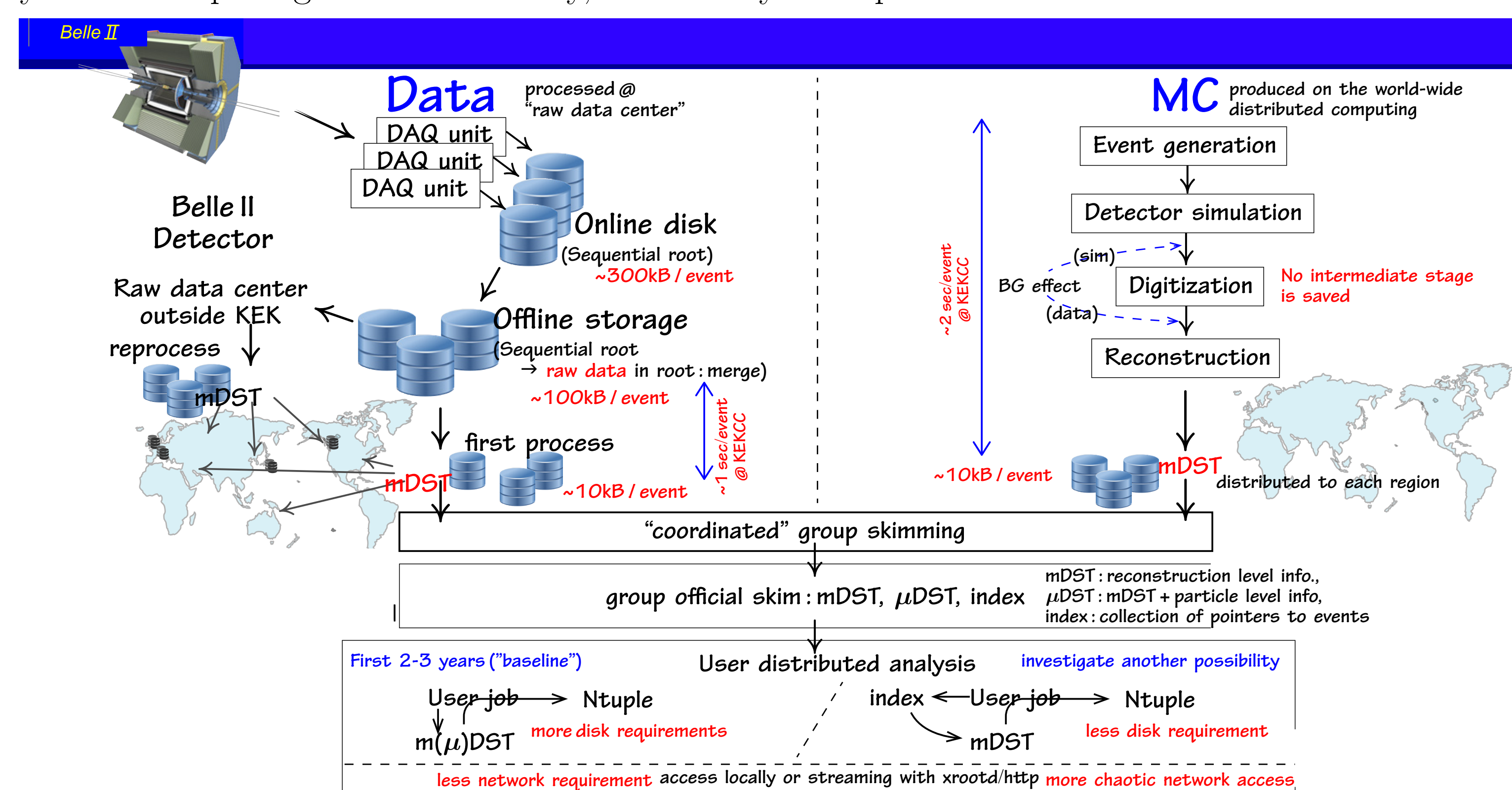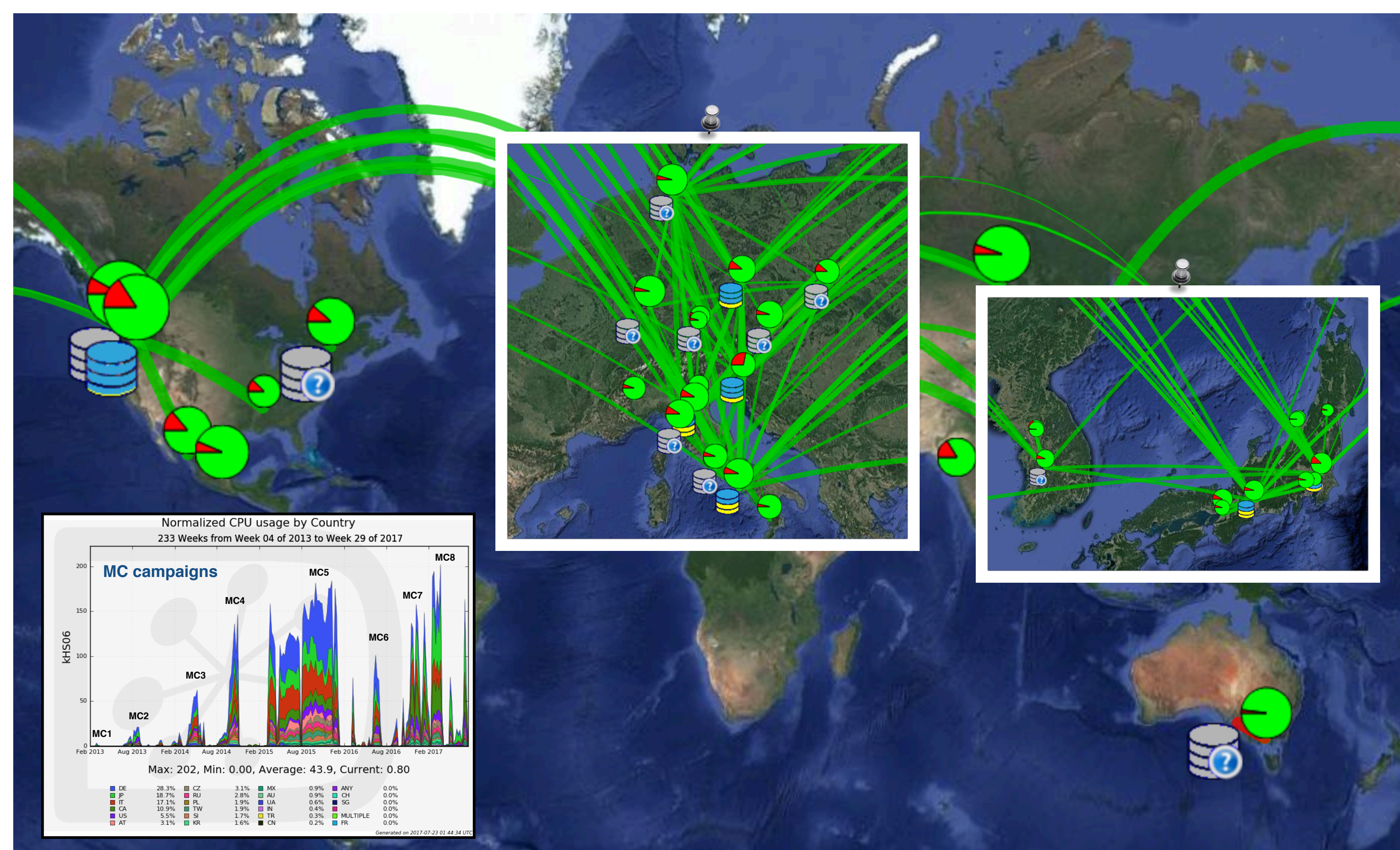

Diagram of the data flow in the Belle II computing model.

MC Campaigns

The MC campaigns take advantage of a grid created by 47 high-performance sites around the world. An average of 20,000 running processes continue for a few months to provide valuable samples of simulated events.

High-performance computing sites and high-speed connections make up the Belle II grid system. To the date, eight MC campaigns have been processed on the grid.

References and links

- Computing at the Belle II experiment: J. Phys. Conf. Ser. 664 (2015) no.1, 012002
- Belle II public web page: http://belle2.jp
- Belle II Cinvestav's group: http://www.belle2.fis.cinvestav.mx
- Cinvestav's High Energy Physics Group: http://gae.fis.cinvestav.mx

Belle II

LaTeX TikZposter