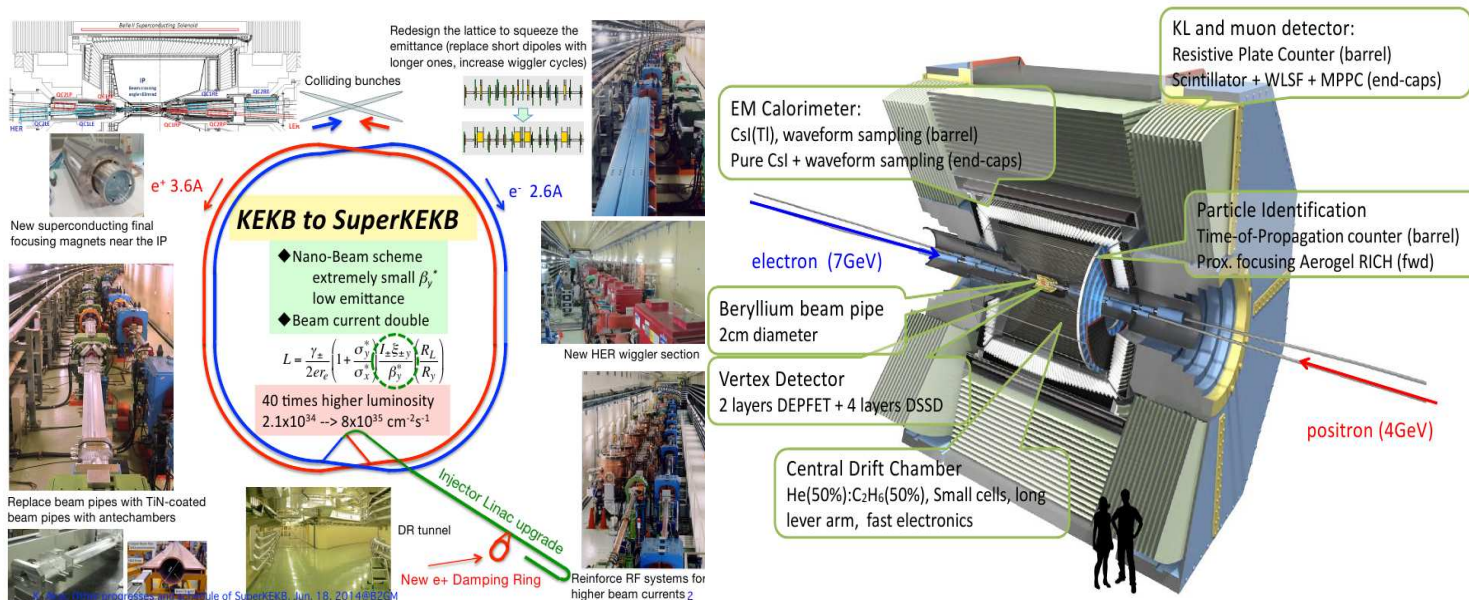


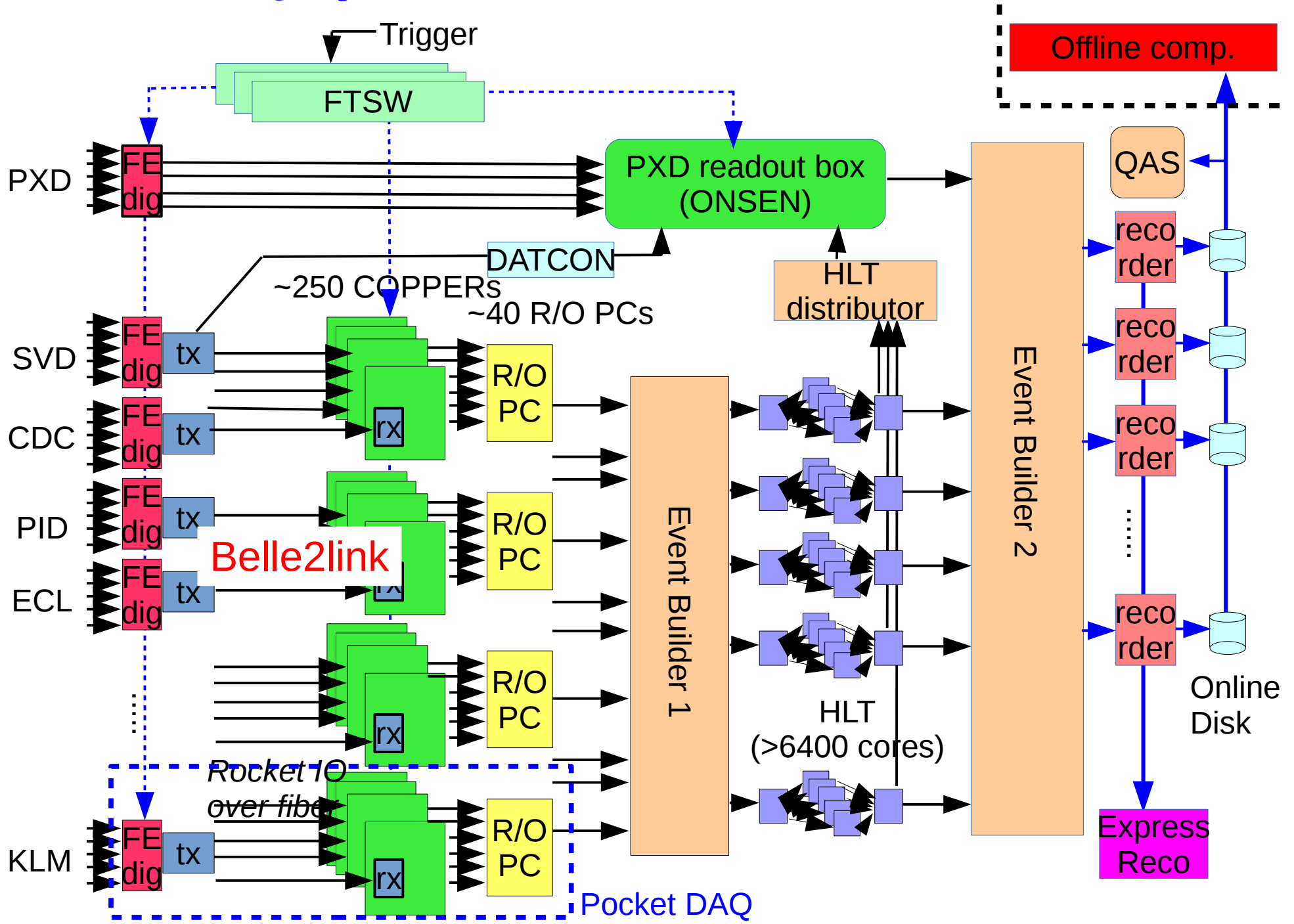
# Initial performance of Belle II High Level Trigger and Back-End Processing in the Beam Commissioning

Ryosuke Itoh, Mikihiko Nakao, Soh Y. Suzuki, Satoru Yamada (KEK)  
 Tomoyuki Konno (Kitasato U.)  
 Zhen'An Liu, Jingzhou Zhao (IHEP, Beijing)  
 Thomas Hauth (KIT), Chunhua Li (U. Melbourne)

- Belle II experiment, which is a new generation B-factory experiment has just started the data taking.
- The DAQ for the experiment is required to manage the data flow up to 30GB/sec at most.
- A high granularity parallel processing is implemented in DAQ.

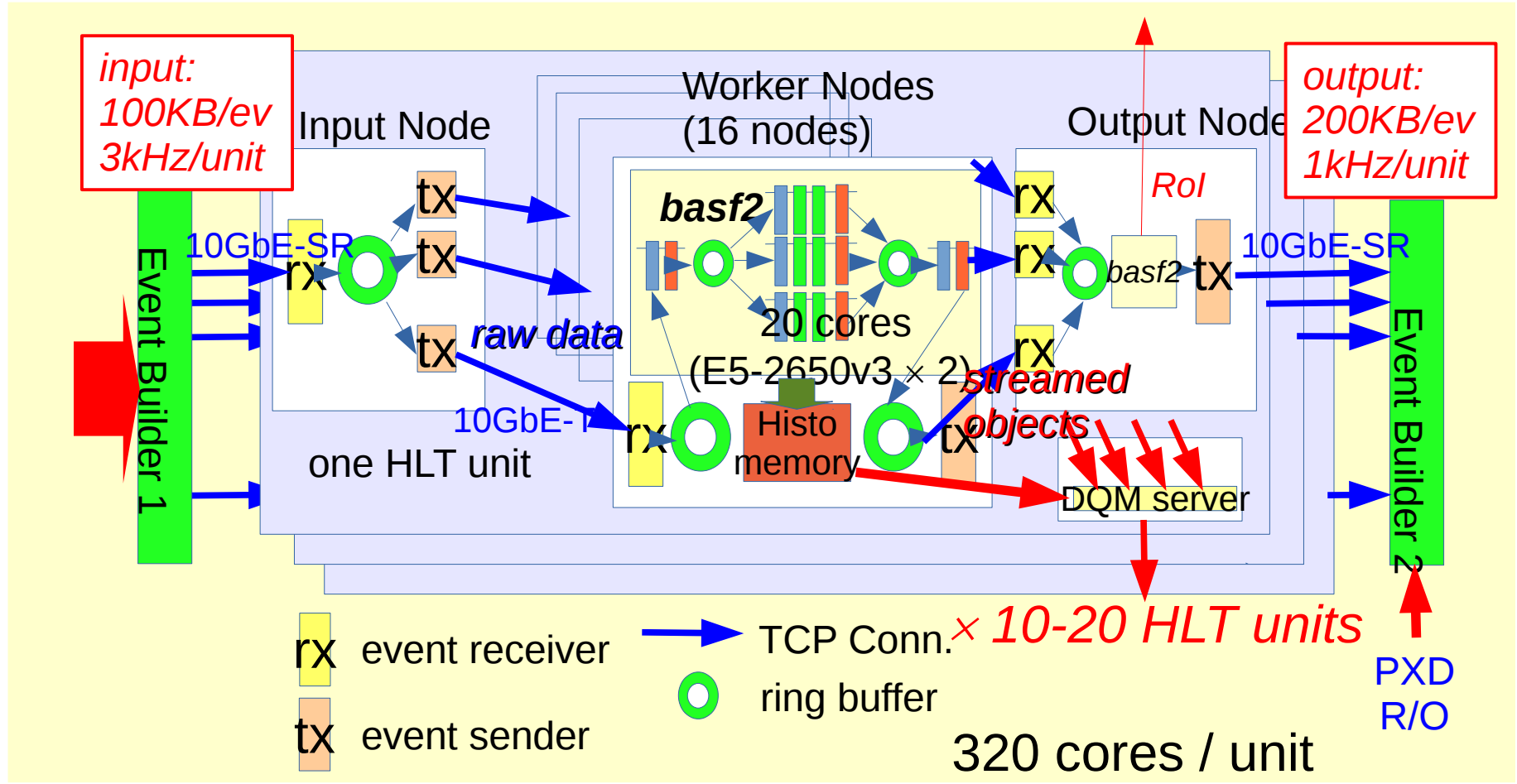


# Belle II DAQ System



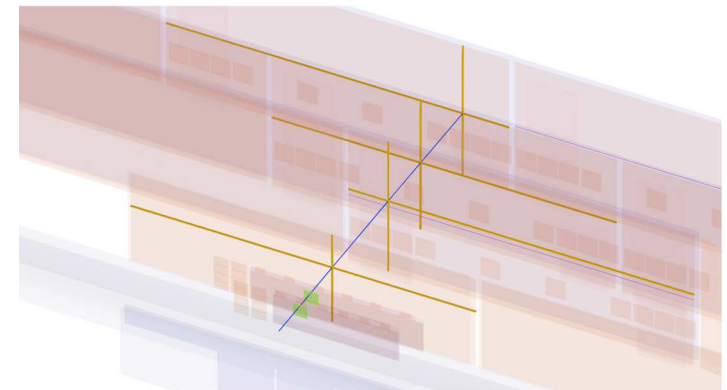
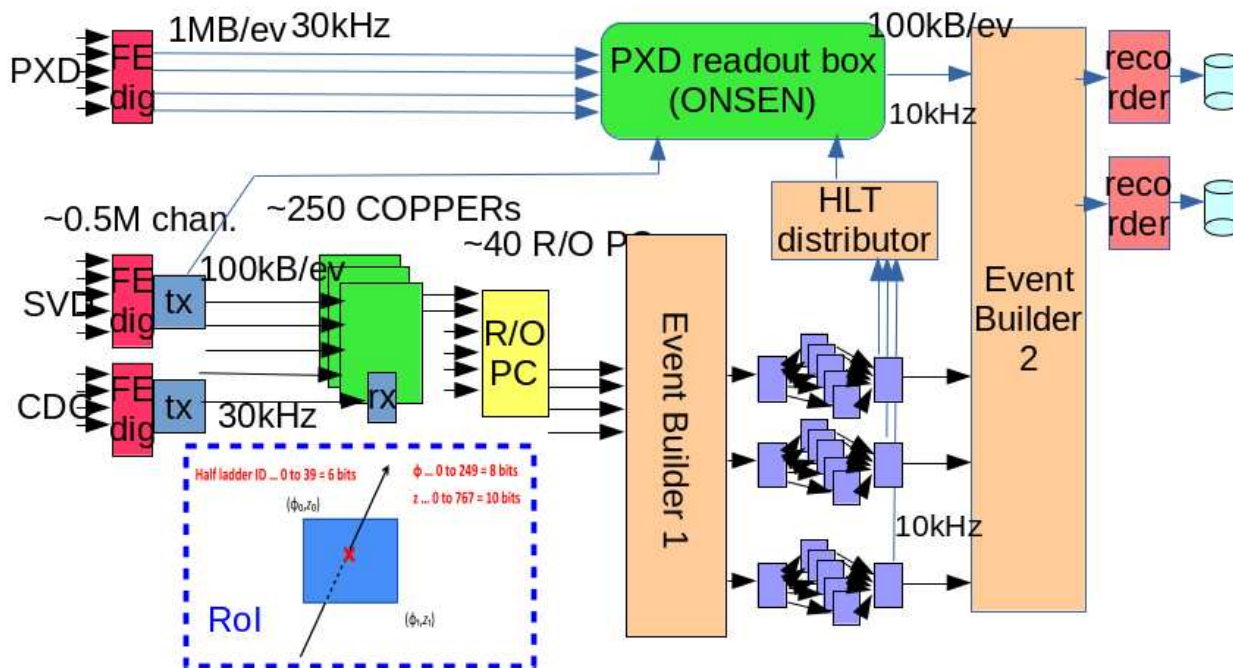
# Belle II High Level Trigger (HLT)

- The HLT has a unit structure where each unit consists of **16 servers with 20 cores (Intel E5-2600v3 x 2)** in total of **320 cores / unit**.
- The event data are processed simultaneously utilizing the parallel processing mechanism implemented in the Belle2 analysis framework (basf2).
- Currently **5 HLT units are in operation** to be prepared for up to 1/4 of the design luminosity.
- More units are being prepared to keep up with the gradual luminosity increase.
  - > 20 units equivalent is required to process the full design luminosity.



# RoI feedback to Pixel Readout

- One of the characteristic features of Belle II HLT is the feed-back of tracking information to the readout of Pixel Detector(PXD) for the data reduction.
- The data size from PXD is  $\sim 1\text{MB/event}$  for the typical occupancy and the online reduction is a must.
- The results of tracking using SVD and CDC are extrapolated onto the surface of PXD sensors and boxes (Region of Interest:ROIs) are defined.
- The coordinates of ROIs are sent to PXD readout and only the hits in the boxes are saved.
- The reduction factor is expected to be better than  $1/10$ .





# Commissioning in beam (Phase 2 run)

- The commissioning of the SuperKEKB accelerator for the beam collision has started from March, 2018.
- **At 00:38 on Apr. 26<sup>th</sup>, the first hadronic event was observed.**
- The accelerator luminosity is up to a few  $\times 10^{33}$  for today, but it is improving.
- The typical Level 1 trigger rate is still up to 500Hz.
- HLT is being operated with the full event reconstruction software + software trigger. All the events are recorded with the trigger tag for now.
- Full event processing chain including ExpressReco, Live DQM and Event Display is working stably.
- Vertex detectors (PXD and SVD) currently installed are prototype and the coverage is limited, but the RoI feedback was confirmed to work.

 Please come to Poster 534!

