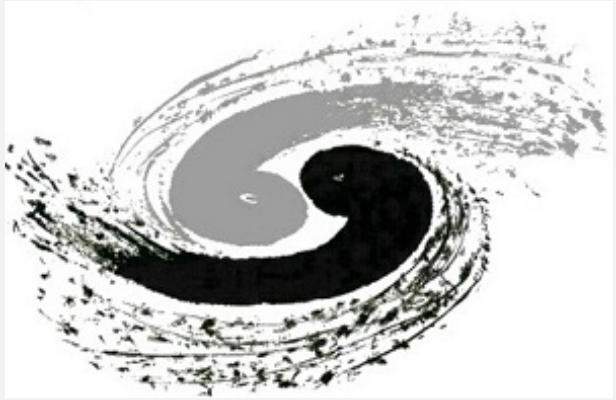

THE ONLINE DQM OF BESIII

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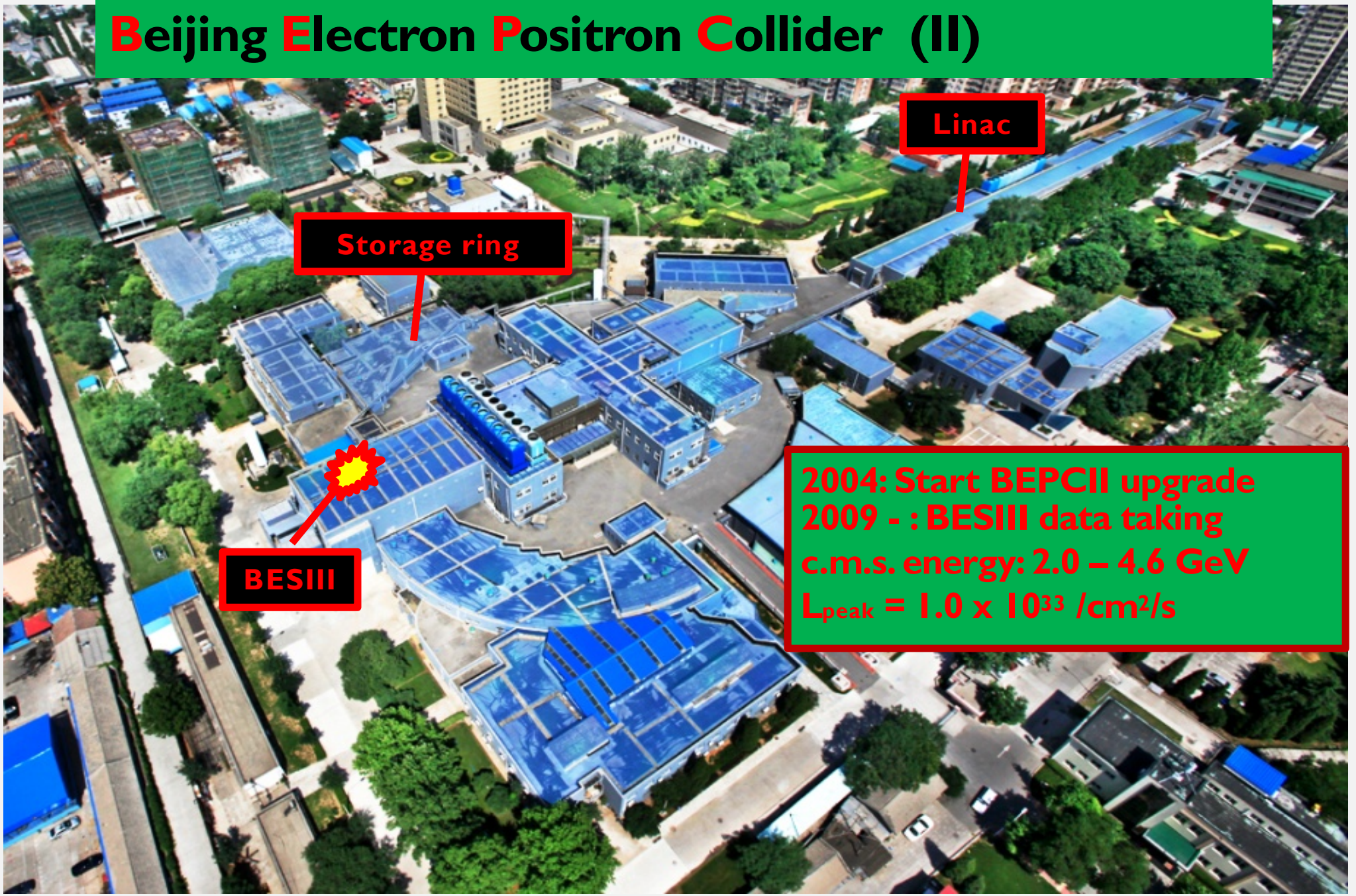
CONTENTS

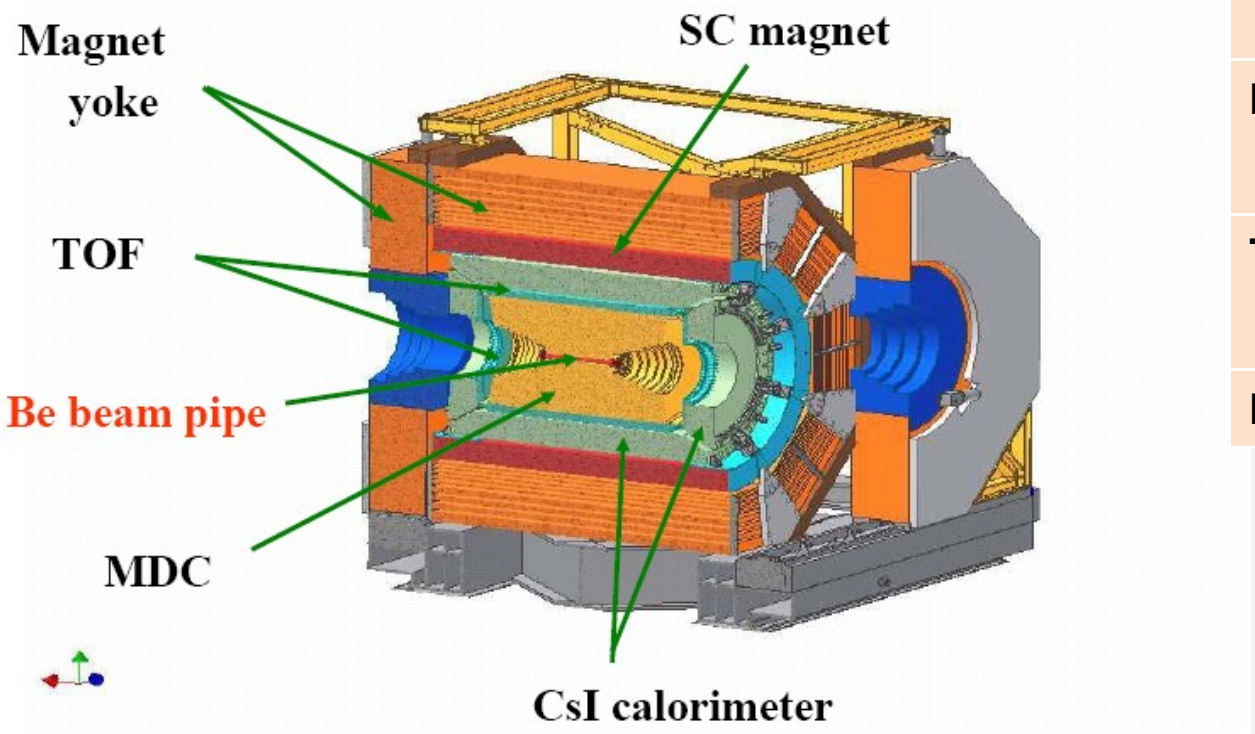
- Introduction to BEPCII and BESIII
- The overview of BESIII DQM
- Summary

Beijing Electron Positron Collider (II)



BESIII

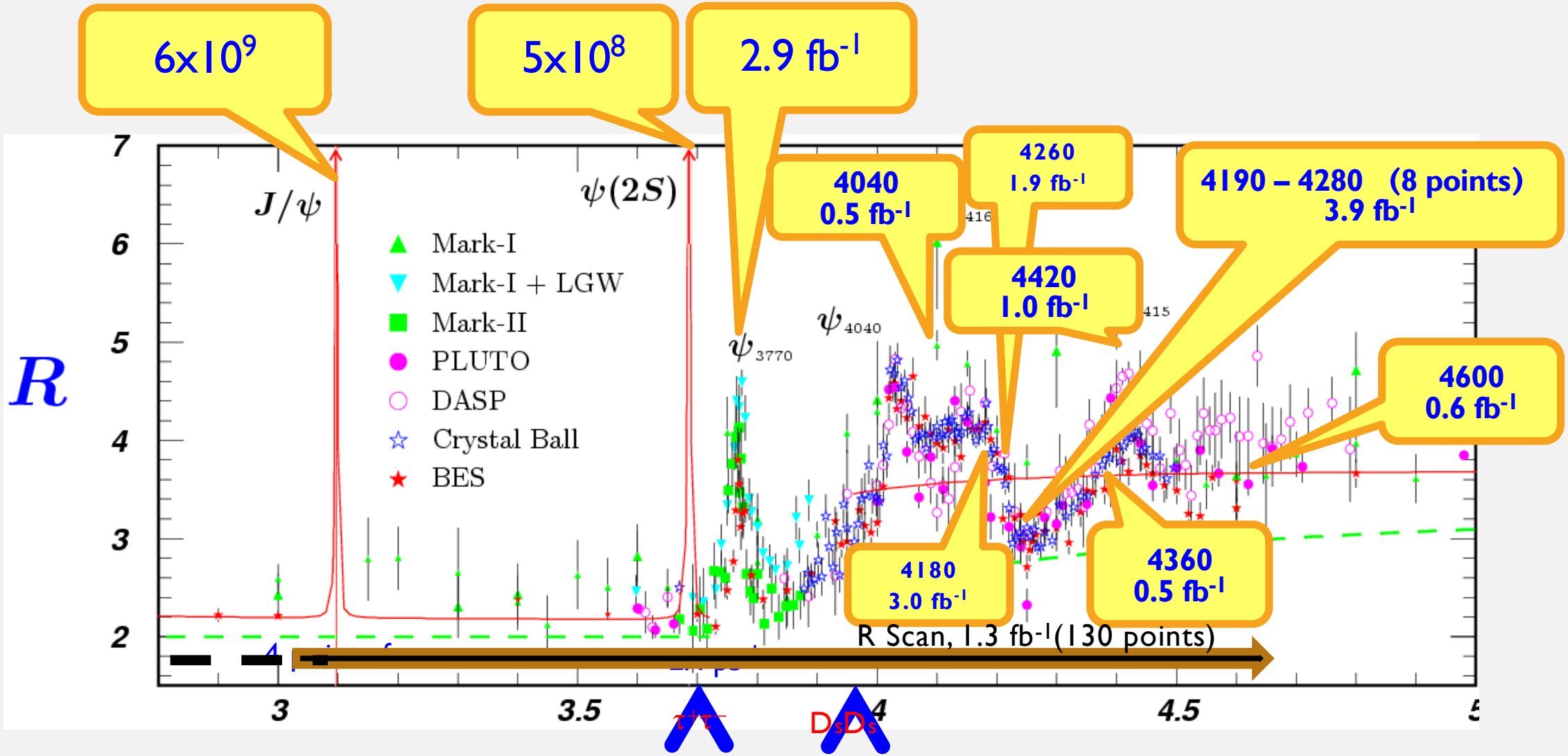
The BESIII Detector



Sub-detectors			Performance
MDC	Momentum resolution		0.5%@1GeV
	dE/dx resolution		6%
EMC	Energy resolution		2.5%@1GeV
	Spatial resolution		6 mm
TOF	Time resolution	Barrel	80 ps
		Endcap	110 (70) ps
MUC	9 layers RPC, 8 layers for endcap		

Trigger rate: ~ 4 KHz
Data rate : ~ 40 MB/s

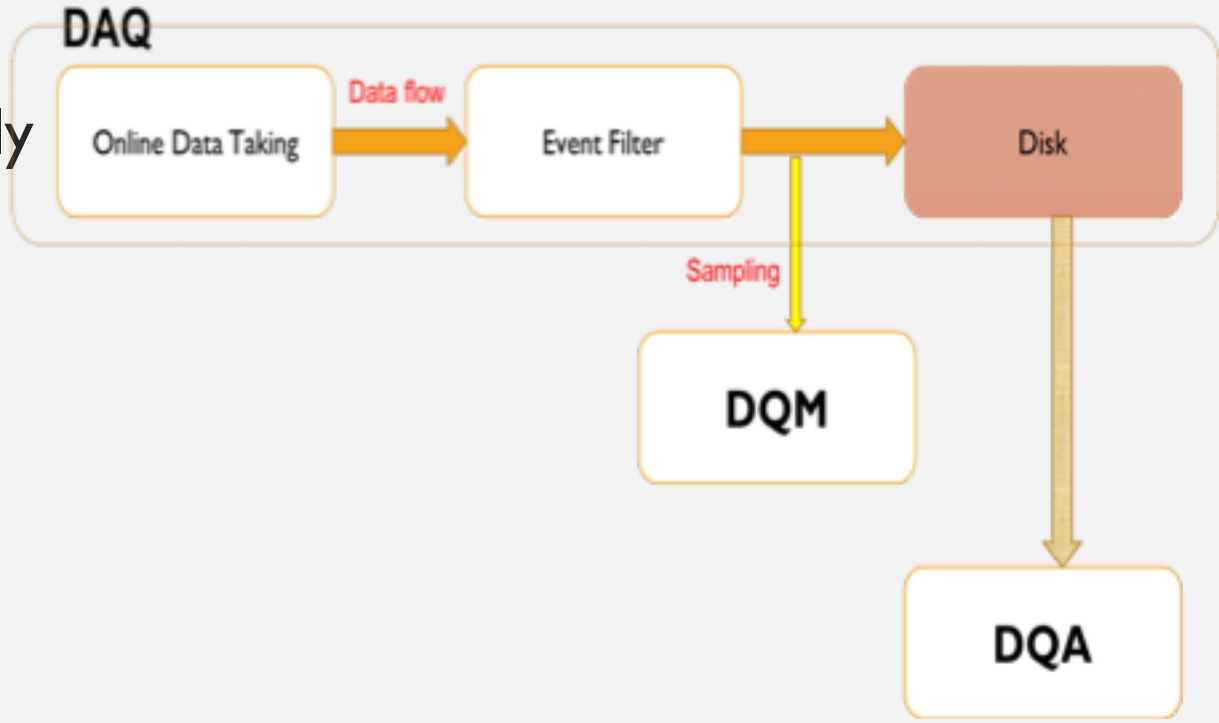
DATA SAMPLES



DATA QUALITY @ BESIII

- Data quality monitoring: Monitor the detector and the data, find problems in time

- BESIII has three level monitoring
  - **DAQ**, no or fast data reconstruction, mainly the hitmap of each sub-system and electronic
  - **DQM,** online full reconstruction, higher level (physics) monitoring
  - **DQA**, offline full reconstruction with updated calibration constants



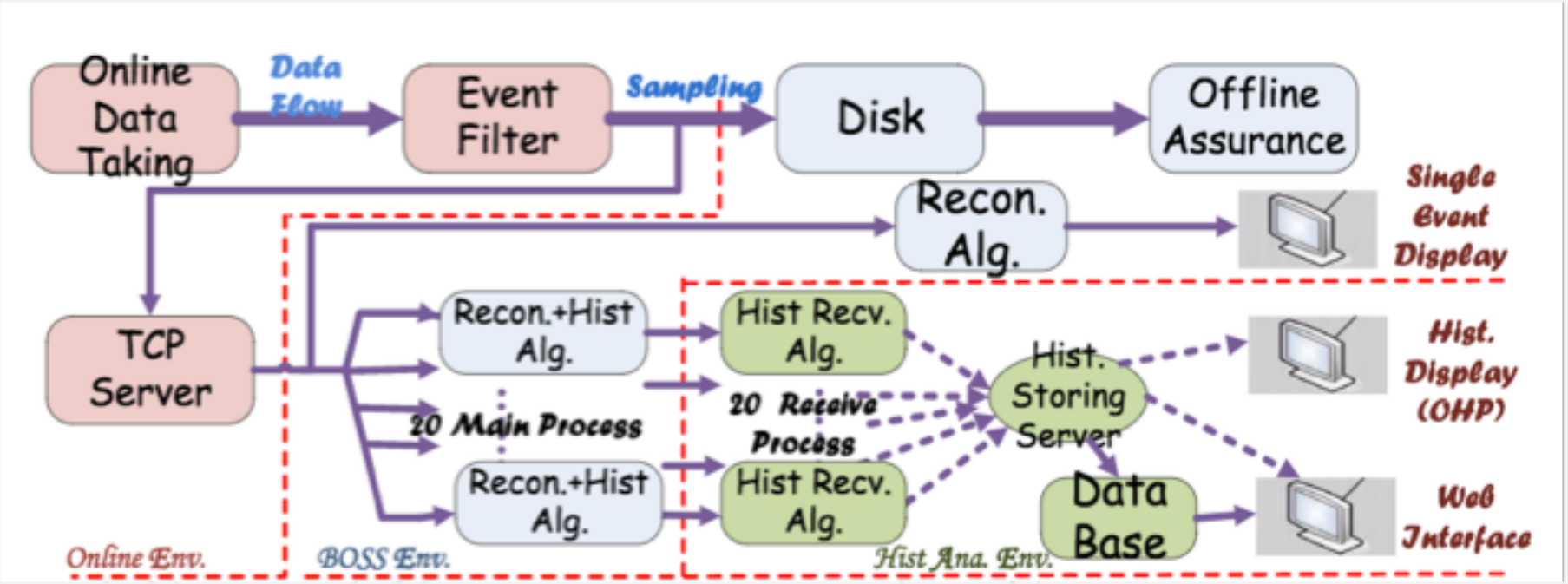
DQM – HARDWARE AND PLATFORM

- 1 server for DQM system management and virtual machine host
  IBM x3650 M4, 2 Intel Xeon E5-2630 2.3 GHz
- 5 computing nodes for data reconstruction and analysis
  IBM Flex System x240, Intel Xeon E5-2620 2.0 GHz, total 24 cores / node
- 2 client machines (PC) for results display

- OS: SLC6, SLC5
- Language: C++, python, bash

DQM COMPONENTS

- DQM Server
- DQM Clients
- Histogram handling
- Event display
- Histogram display
- Database (MySQL)
- Webpage

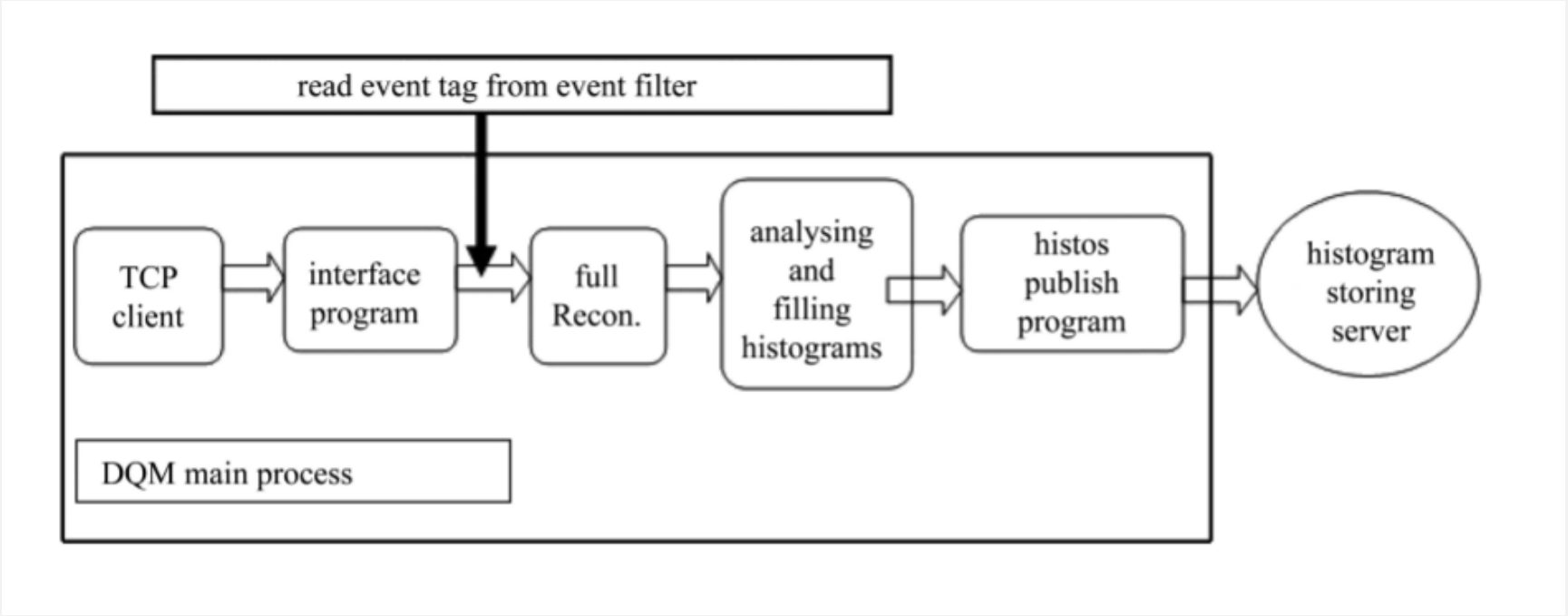


DATA SERVER

- The aim of the data server is to provide data to all DQM clients
- It runs on DAQ machine.
- Sampling (copy) data from DAQ data flow
- Data is transferred to DQM machine through TCP/IP
- Star/stop with run (Controlled by DAQ)

DQM CLIENT

- Main component of DQM system
- Receive data from DQM server
- Using offline software to reconstruct and analyze data
- Results are stored in ROOT histograms
- Publish histograms



HISTOGRAM HANDLING

- Modified from ATLAS tdaq, ROOT based
- **Histogram server**: store all histograms
- **Histogram receiver**: receive published histograms by DQM Client and publish to Histogram server
- **Histogram merger**: merge histograms from all DQM Clients, and publish merged histograms to Histogram server
- **Histogram display**: display selected histograms to shifter

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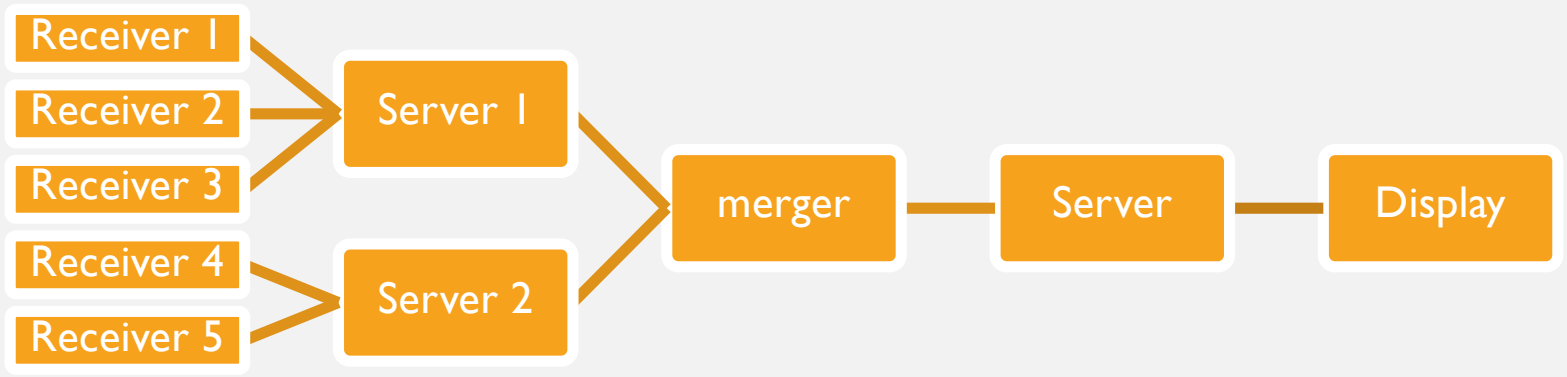
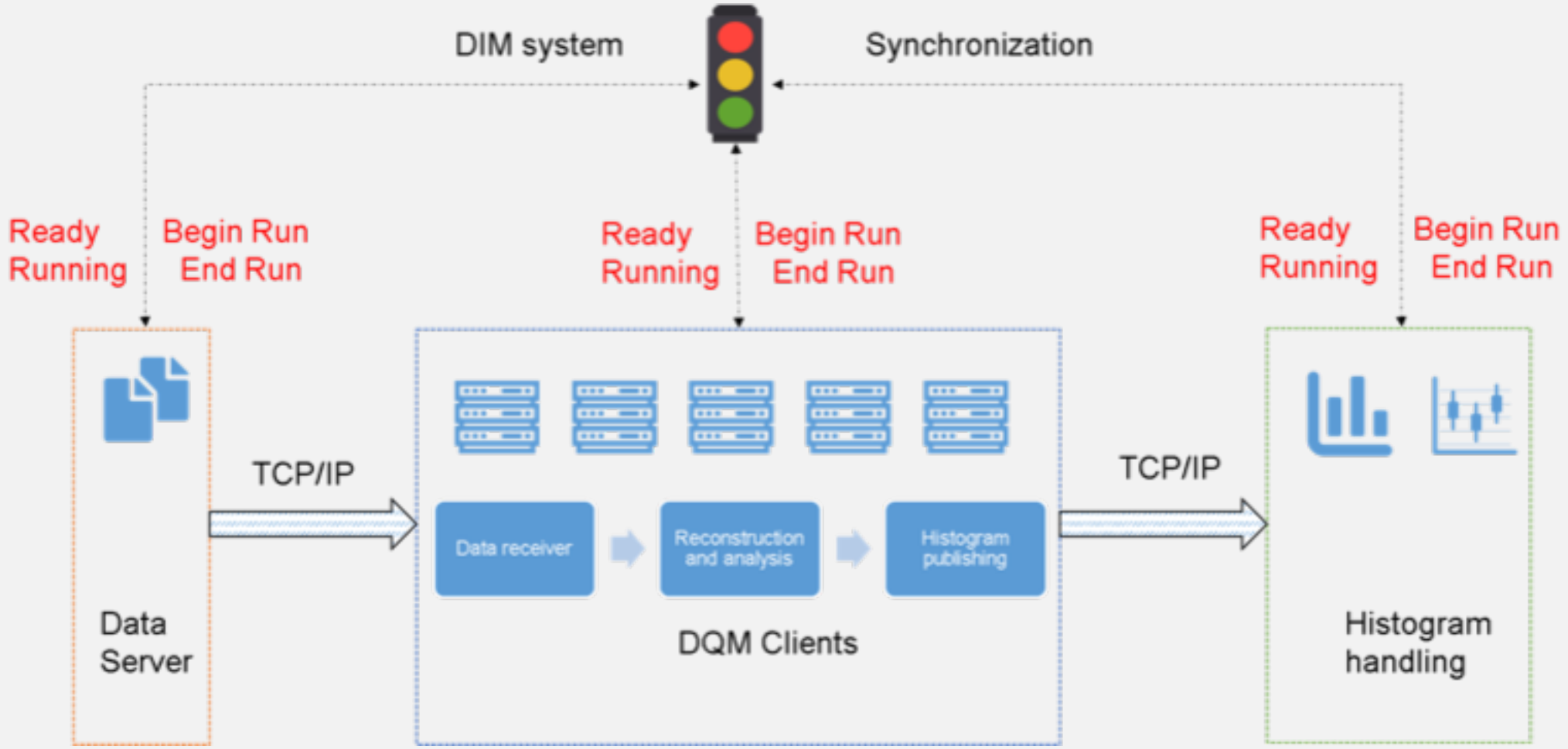


DQM JOB CONTROL

- DQM is run in stand-by mode, when the data-taking is started, it runs automatically
- DIM (Distributed Information Management System) is used to synchronize all components
- After a run is finished, all merged histograms are stored in a root file
- A script is used to monitor the new generated root file
- A separate job will deal with the root file, obtains useful information of the run, and put them in the database (MySQL)
- Users can check theses information from the webpage

OVERALL STRUCTION

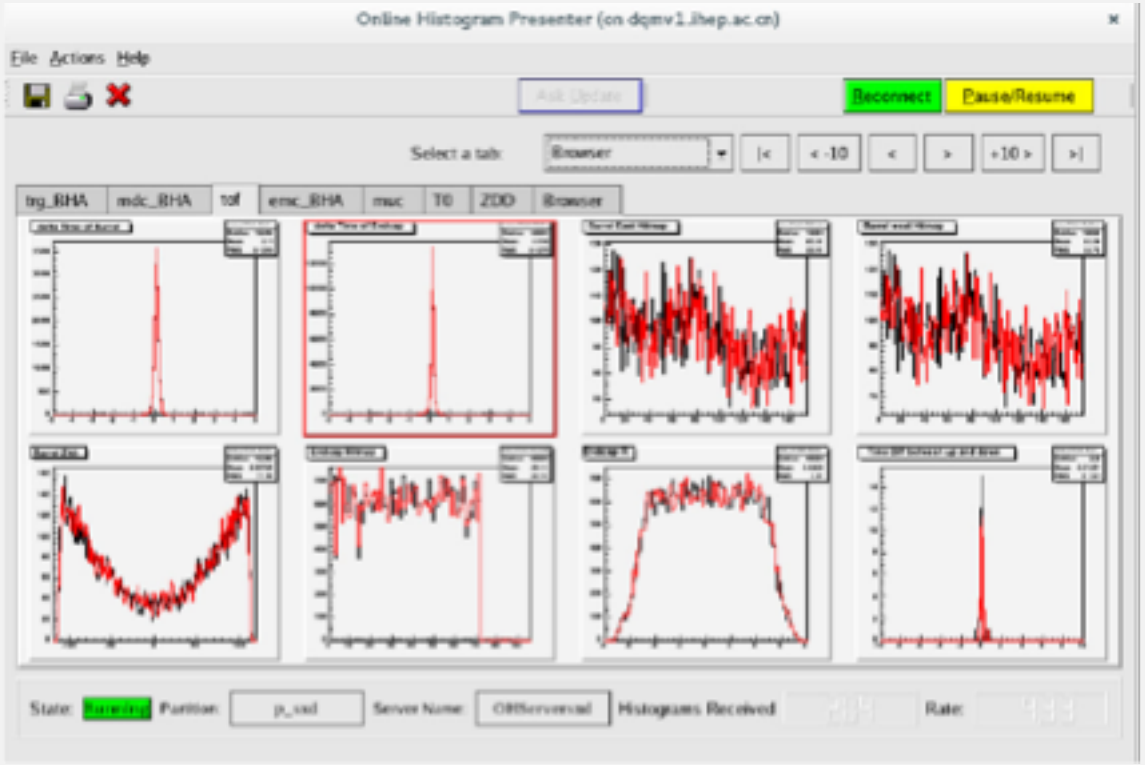


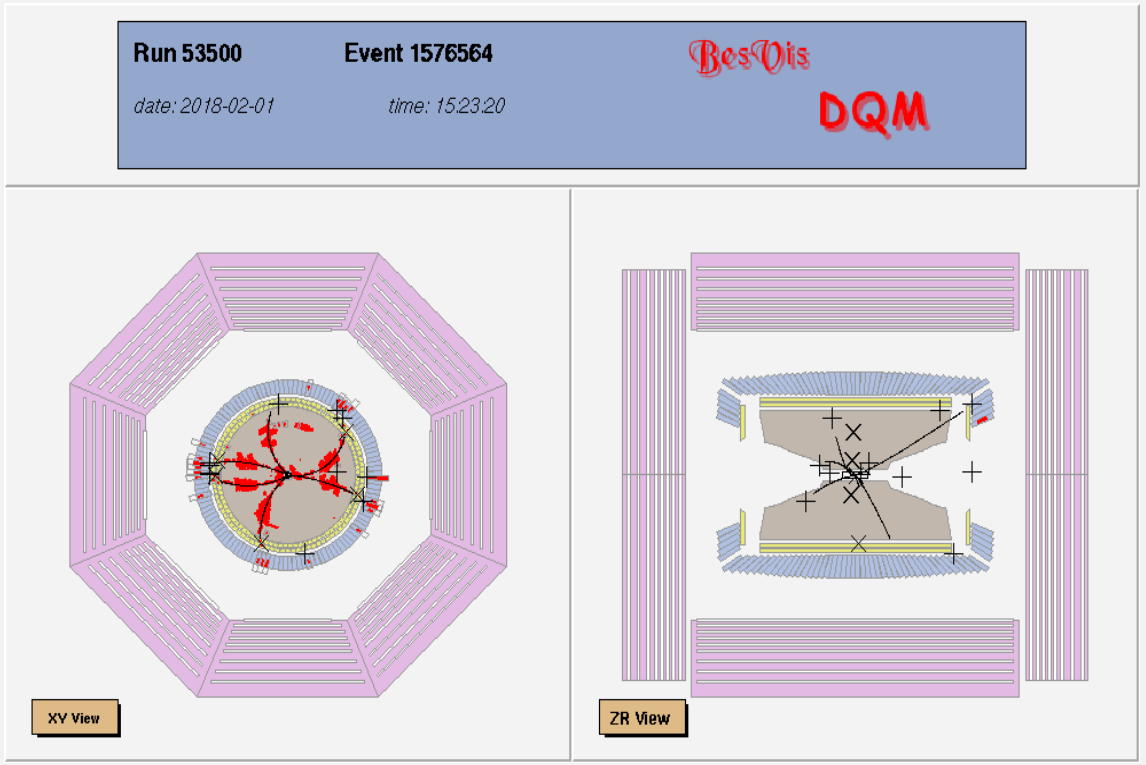
SELF-MONITORING

- Ganglia is used to monitor the whole DQM system

- Crashed jobs: restart automatically
- Dead jobs: lose response, do not update histogram any more
  - Run number monitoring
  - Job statics, how many events have been processed for each job
  - CPU usage

RESULTS DISPLAY





SUMMARY

- BESIII DQM is a lightweight online DQM solution
- Using full reconstructed events to monitor the data
- Separate online DAQ and offline software environment as much as possible
- Expandable
- Successful running at BESIII

Thank You!