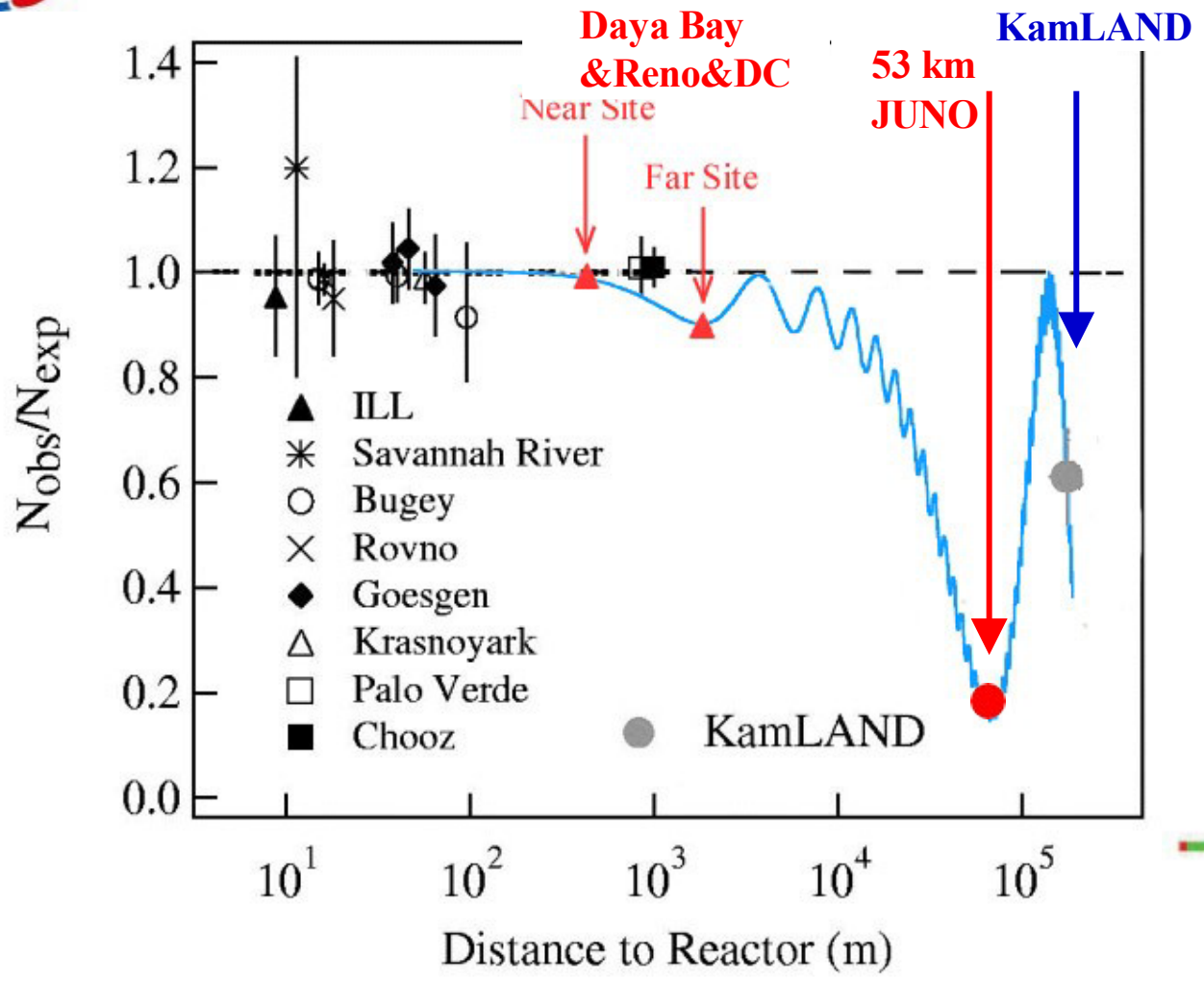
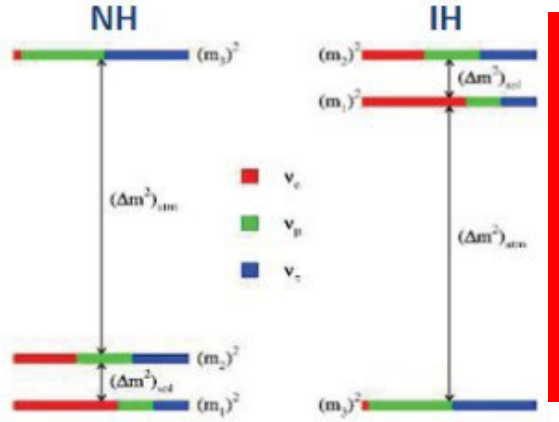
Jiangmen Underground Neutrino Observatory

JUNO physics summary



- **20 kton LS detector**
- **~3 % energy resolution-the greatest challenge for MH**
- Rich physics possibilities-neutrino oscillation and other particle program
  - ⇨ **Mass hierarchy**
  - ⇨ **Precision measurement of 3 mixing parameters Δm^2_{atm} Δm^2_{sol} θ_{12}**
  - ⇨ **Supernova neutrinos**
  - ⇨ **Diffuse supernova background**
  - ⇨ **Geo-neutrinos**
  - ⇨ **Solar neutrinos**
  - ⇨ **Atmospheric neutrinos**
  - ⇨ **Nucleon Decay**
  - ⇨ **Exotic searches**



Background challenge target range for g/g of U and Th
10^{-15} (minimum requirement)
10^{-17} (ideal)

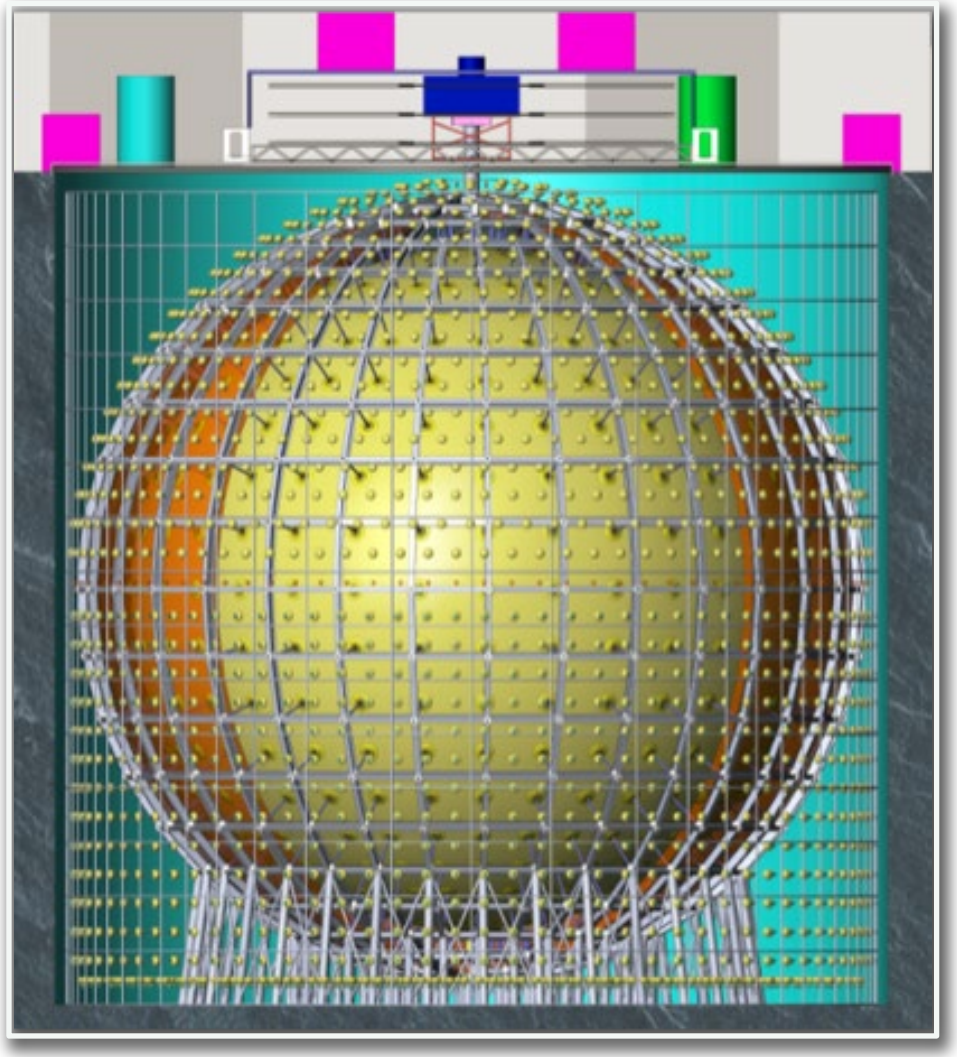
Neutrino Physics with JUNO, J. Phys. G 43, 030401 (2016)
JUNO physics and detector, Progress in Particle and Nuclear Physics 123, 103927 (2022)

A large LS spherical detector

- **LS large volume: ➔ for statistics**
- **High Light yield and transparency➔ for energy resolution**

Steel Truss
Holding PMTS
17612 x 20”
25600 x 3”

Acrylic Sphere
filled with 20 kton
of liquid scintillator



JUNO collaborations is made from 74 institutes in 17 countries and more than 700 collaborators

Armenia	Italy
Belgium	Pakistan
Brazil	Russia
Chile	Slovakia
China	Taiwan-China
Czech	Thailand
Finland	U.K.
France	U.S.A.
Germany	

CD status

⇐

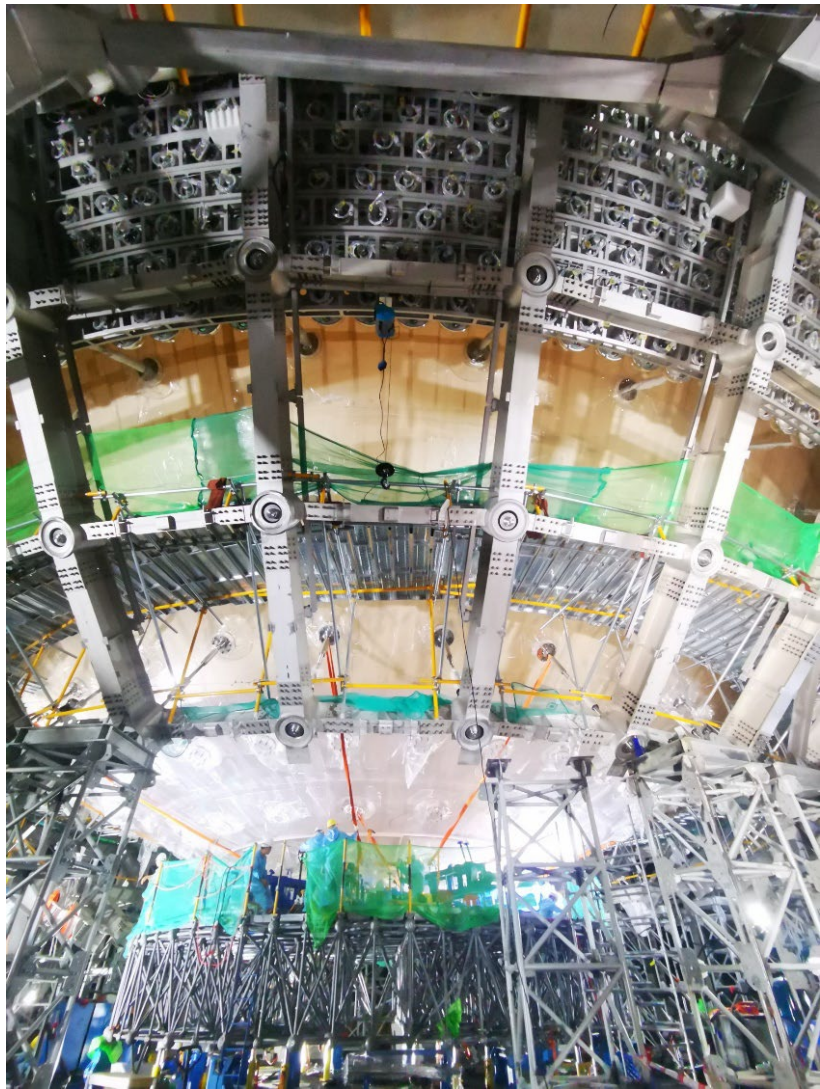
Acrylic

⇒

LPMT

Modules

Data taking expected on 12/2024

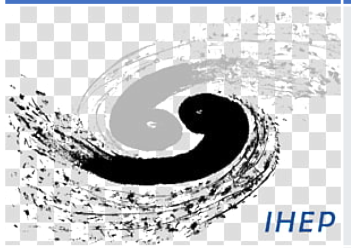


Data volumes, computational requirements

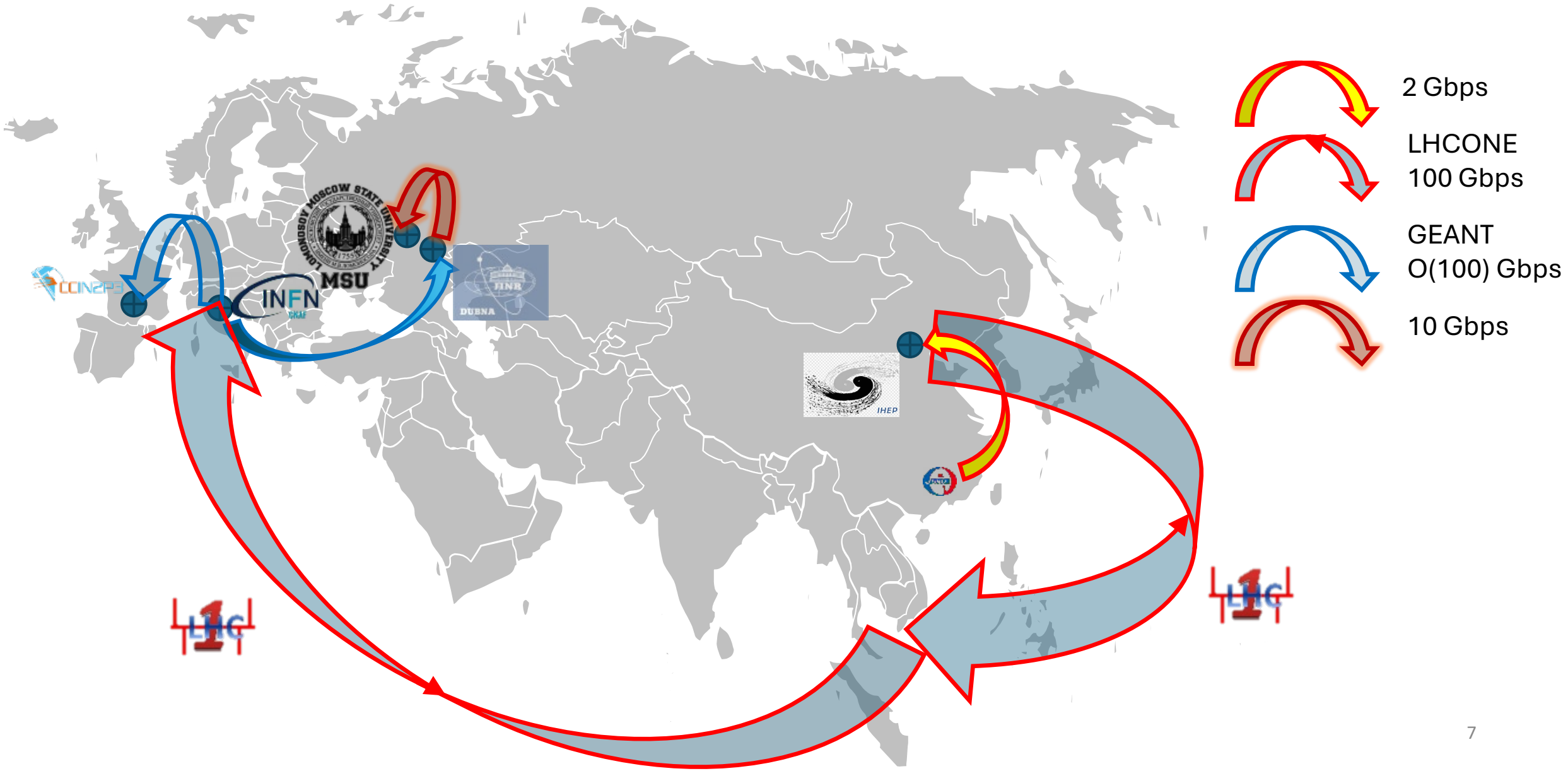
Estimated Raw data production	60 MB/s ↔ 2PB/year
Estimated other data (reconstructed, calibration, analysed)	1.0 PB/year
Bandwidth required to copy 3 PB in 1 year	0.8 Gbps

- 1 event reconstruction goal: 5s with a 18 HS06 core
- Rate: 1kHz
- Reconstruct 1 year data in 1 year then requires about 155 kHS23.

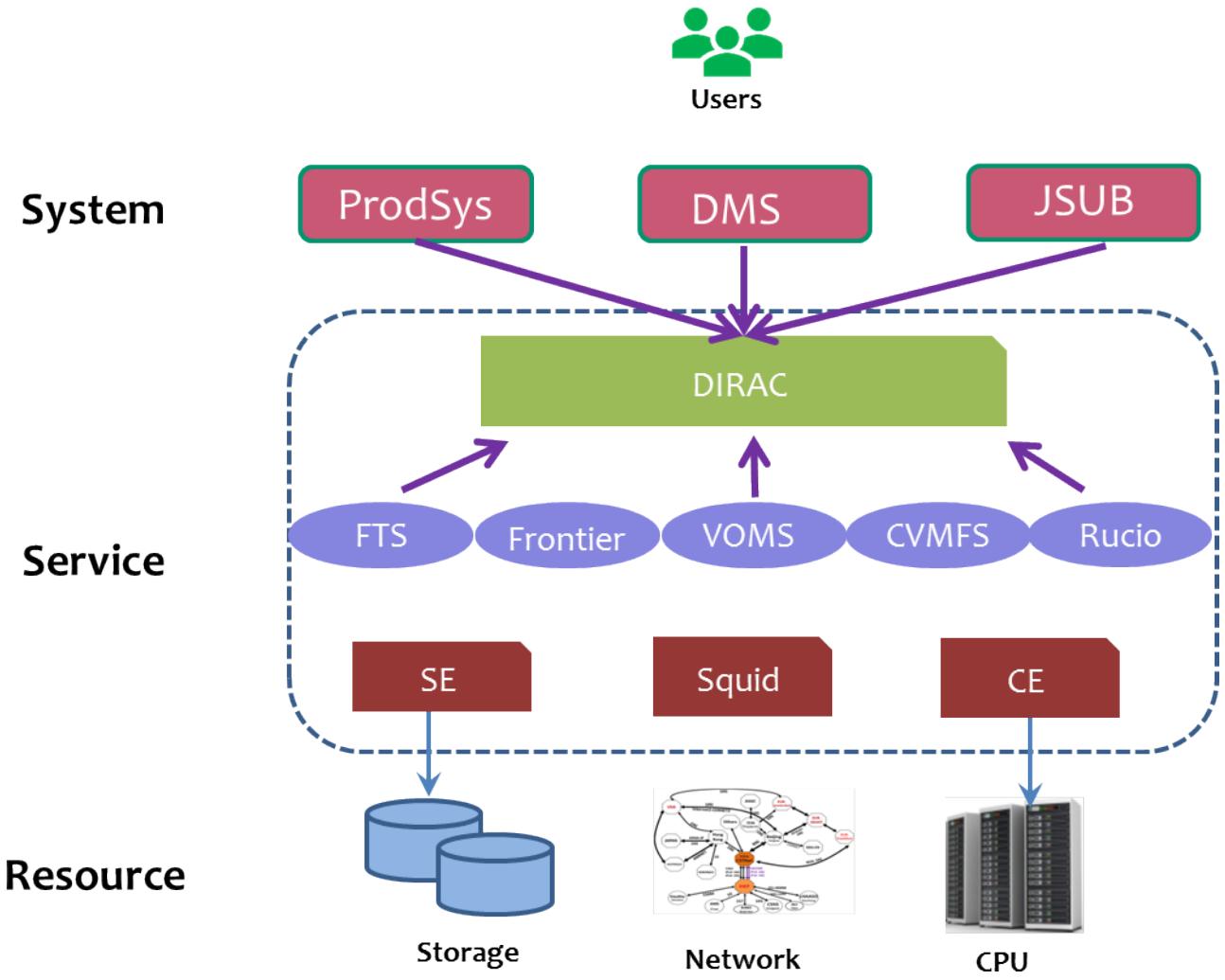
JUNO Data Centres

	Role	Foreseen in 2024		
		CPU (kHS06)	Disk (PB)	Tape (TB)
	T0: next to JUNO site, collect all data, DQM, first reconstruction	180	8.0	4.0
	T1: 1/3 of data, computing power	15	0.2	2.0
	T1: full data, computing power	20	3.0	1.0
	T1: full data, computing power	120	10.0	10.0
	T2: no data, computing power; not yet on line			
Totals		335	21.2	17.0

International networks



DCI Architecture



JUNO DCI and EGI: ticket management

- JUNO DCI based mostly on WLCG tools
- Main way for communicating with supporting teams is by EGI ticketing system
  - Logical to use it also for JUNO internal ticketing system
- Already started to try using GGUS in a restricted group
  - JUNO DCI managers
  - Data centres in JUNO DCI
- Waiting the new ticketing system to gradually open to all the JUNO community

JUNO DCI and EGI: accounting and monitoring

- JUNO DCI is developing a monitoring system with dashboard
- Integrating and comparing external monitoring tool is seen as useful to emerge problems

- Accounting is managed from Computing and Steering Group
- At the moment, based on the data coming from internal monitoring
- Useful to compare with EGI tools, in use from a long time

Conclusions

- Juno is approaching data taking and the real test of JUNO DCI
- JUNO need to put in place:
  - A ticketing system for its support system
  - Accounting and monitoring to double check the system