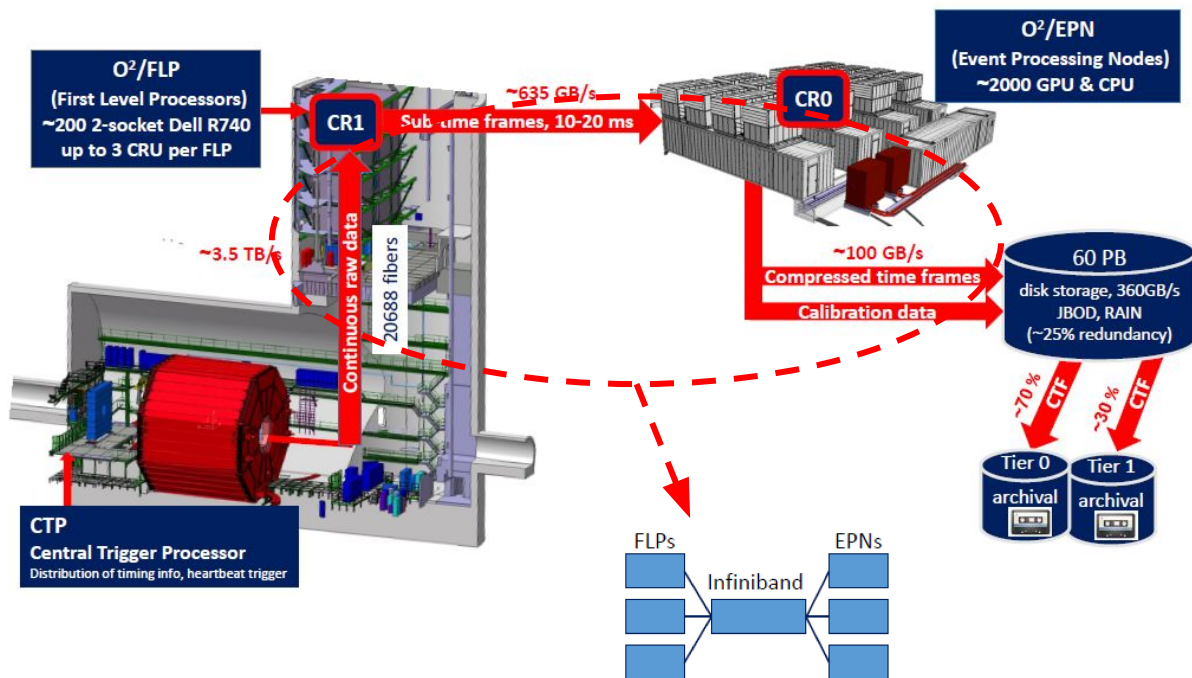# O2 data compression

Two TPC data rejection strategies have been implemented:

- A (conservative): reject only clusters of identified background / tracks loopers

- B (aggressive): keep only clusters attached or in proximity of identified signal tracks

CTF data rates and O2 buffer size

- Estimates:

	Avg. event size (MB, 10^6)					
	No rejection		Strategy A		Strategy B	
	min	max	min	max	min	max
50 kHz	2.84	2.88	2.61	2.65	2.10	2.14
25 kHz	3.04	3.08	**2.78**	**2.82**	2.19	2.23
10 kHz	3.21	3.25	2.93	2.96	2.24	2.29

- ○ A: 98 - 133 GB/s; B: 86 - 107 GB/s
- ○ Compression factor depends on Interaction rate
- ○ Expected average Interaction rate ~22 kHz
- ○ In 2022 we plan to compress data according to the more conservative strategy A

- In 2022 expected 2.7 nb^{-1} in 24 days of HI collisions:
  - ○ 2.1×10^{10} events x *2.85* MB/event => *60 net-PB*
  - ○ Technical overhead 95% => *64 net-PB*; with EOS RAIN overhead => *80 PB raw* capacity
  - ○ +20% contingency/safety => *97 PB raw* only for Pb-Pb
  - ○ Contingency for uncertainties due to
    - ■ LHC performance
    - ■ Real life performance of the detectors (TPC in particular), the compression algorithms and tracking

Summary and further validation

- Rate to O2 storage - max 130GB/s - within the margin of initial estimates
- Size of O2 storage - 100PB raw capacity
  - Covering the most recent/accurate luminosity + event size calculations for Pb-Pb
  - +20% safety/contingency
- O2 storage tests (over 2 years of operation covered)
  - Validated for write and read rates - above the required and expected ones
  - Validated for operational support and downtime (availability and reliability) - sufficient for any reasonable data taking scenario and expectations
  - Validated for data loss - below simple disk-failure based probability calculations
  - *Remaining test will be done with the full system (including the P2-CC links; 197 out of 250 EPN nodes being installed at P2 as we speak)*
  - *The plan from now to the beginning of global commissioning (Jan-Jun 2021) includes full-scale test to cover these validation steps*