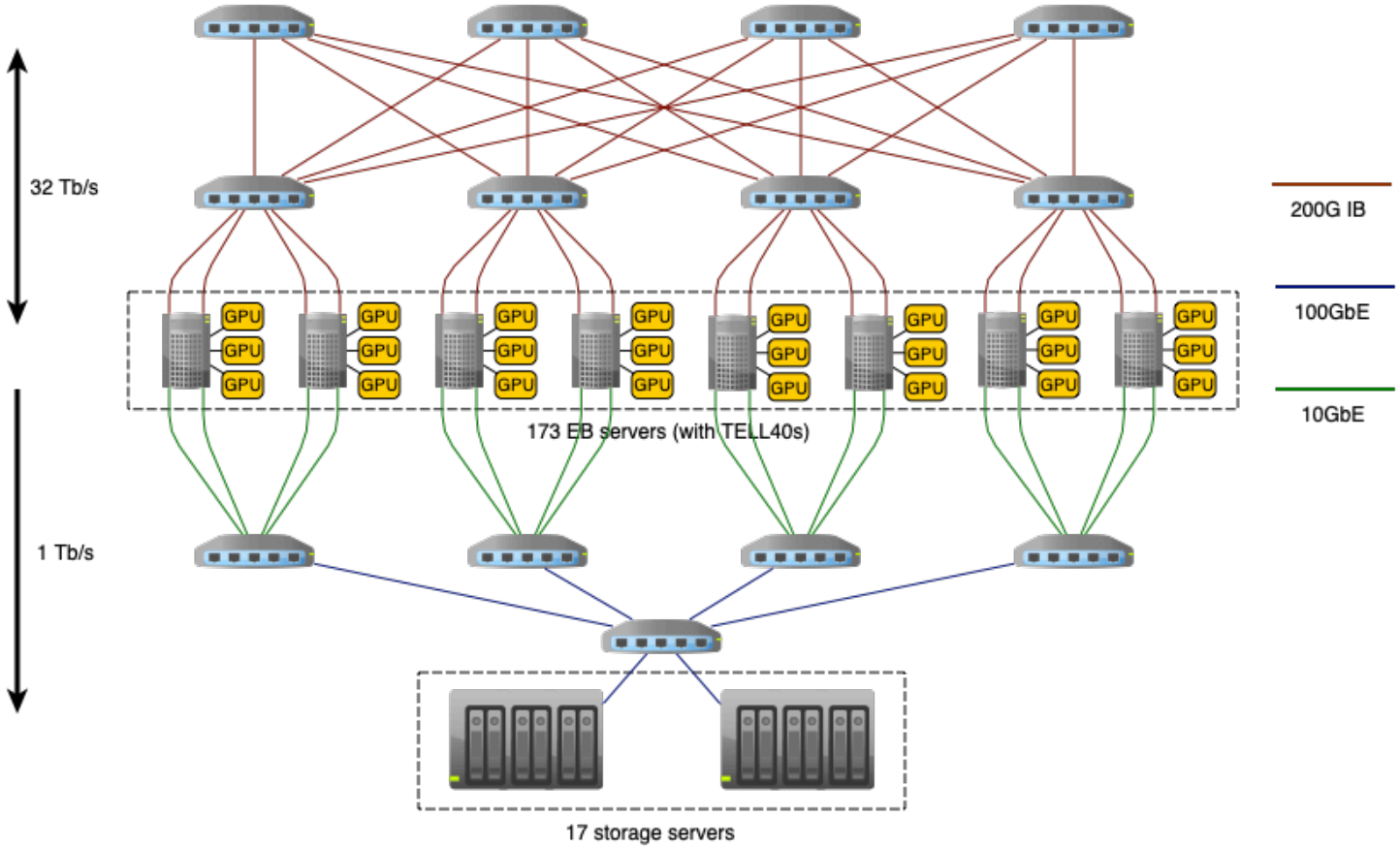
LHCb Trigger-DAQ

Marina Artuso with many thanks to **V. Gligorov**

LHCb Trigger-DAQ for RUN3 [arXiv:1912.09161]

- 40 Tb/s full detector readout @ 30 MHz ($2 \cdot 10^{32}$ $cm^{-2}s^{-1}$)
- Level-1 mostly a traditional selective trigger, output saturated by signal: **implementation of GPUs** s will reduce data rate to **1 Tb/s**
- Level-2 trigger real-time analysis reconstructs signals with offline analysis quality in real-time. Allows rest of event to be discarded for high-rate signals like charm: **implemented on CPUs** will reduce data rate to **80 Gb/s**



LHCb Trigger-DAQ for HL-LHC

- Goal: run at up to $1.5 \cdot 10^{34}$ $cm^{-2}s^{-1}$, almost O(Pb/s) data rate
- Processing complexity dominated by Level-2.
- As single event complexity and Level-1 rate increase linearly with luminosity, overall processing cost rises quadratically.
- Exploit new reconstruction algorithms (e.g. **AI**) or detector information (e.g. **timing**) to suppress pile-up already at Level-1