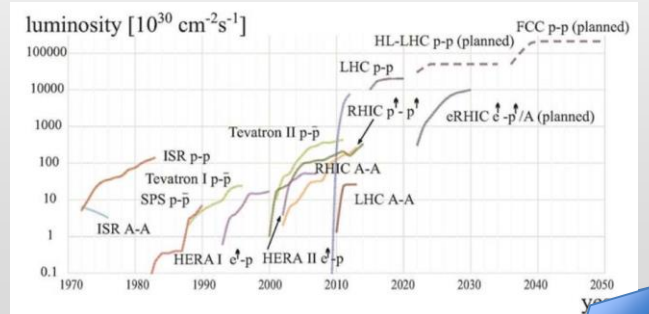
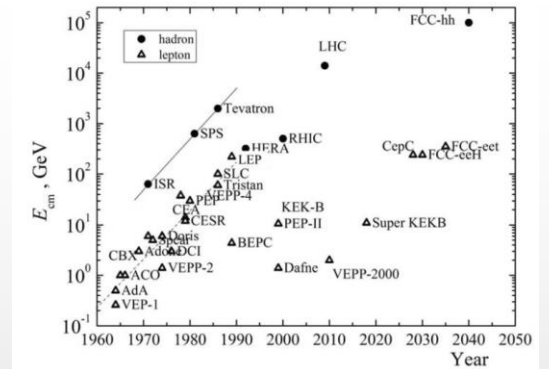


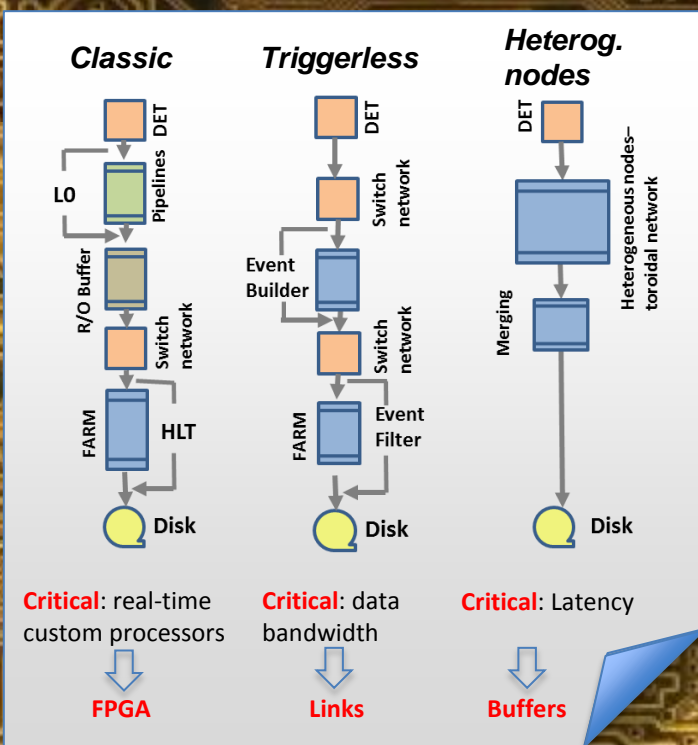
Introduction:

- Next generation HEP experiments will be very challenging from data production and management point of view: **physics reach will be imposed by trigger**
- FCC is only an example: both energy and luminosity increasing will imply higher data fluxes. The situation for rare searches will be even worst.
- At higher luminosity:
 - ◆ Bunch crossing ID more difficult → 4D trigger
 - ◆ More noisy environment → Pile up, multiple showers in detectors
 - ◆ Higher quality selection → Vertex tagging, track isolation, track-calo correlation
 - ◆ Higher energy → need higher resolution for Pt, higher occupancy in forward region
- More resolution & more granularity → **more data & more computing**
- It is difficult to scale present trigger architecture to future experiments → in 203x “trigger” will be something very different than today!



The idea/concept:

- The standard approaches (trigger pipeline and triggerless) will be not suitable for 203x triggers
- We propose a new approach based on:
 - ◆ Time multiplexed trigger on multidimensional toroidal network: to simplify the multilevel trigger scheme and data flux
 - ◆ Very high throughput computing nodes
- The key point is the use of **heterogeneous computing**:
 - ◆ More software less hardware
 - ◆ Central unit (based on FPGA) to “subdivided” the problem to specialized processors
 - ◆ Several type of processors will be exploited to solve the same problem: CPU, GPU, FPGA, CAM, DSP processor, etc.
 - ◆ Same scheme for L0 and L1
 - ◆ Develop a general framework to exploit future processors architecture: TPU (from Google), Neuromorphic (from IBM), etc.



Potential impact:

- The data managing in HEP will be more and more a problem of “big data” and “high performance computing”
- Co-innovation fits perfectly: shared development to address from the very beginning the new technology in links and processors
- The heterogeneous computing is the solution for the next generation HPC. We need to design a scheme to introduce the heterogeneous computing in HEP realtime processing.
- **ATTRACT** could give us the opportunity, for instance, to actively participate in consortium like **OpenPower**