DEVELOPMENT OF HIGH-PERFORMANCE RECONSTRUCTION ALGORITHMS FOR DETECTING LONG-LIVED PARTICLES

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GPU-enhanced LHCb data acquisition system:

- x86 event building units
- 500 GPUs process HLT1
- Only events selected by HLT1 are sent to the x86 servers processing HLT2.
LHCb UPGRADE

Allen: A high level trigger on GPUs for LHCb:

- CUDA-based framework
- Implement HLT1 stage
- Process up to 40 Tbit/s data rate:
  - Reconstruction of charged particles trajectories
  - Finding collision points
  - Identifying particles as hadrons or muons
  - Finding the displaced decay vertices
LONG-LIVED PARTICLES

- Large fraction decays outside of VELO:
  - For $\Lambda_b \rightarrow \Lambda\gamma$:
    - 51% - hits UT & SciFi
    - 37% - hits SciFi only
  - Development of downstream track reconstruction within Allen framework is extremely important!

The objective of my project:

*Contribution to this development*
THANK YOU FOR YOUR ATTENTION

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