EFFICIENT PROCESSING OF ATLAS EVENTS ANALYSIS IN PLATFORMS WITH ACCELERATOR DEVICES

André Pereira

Prof. Alberto Proença (Advisor)

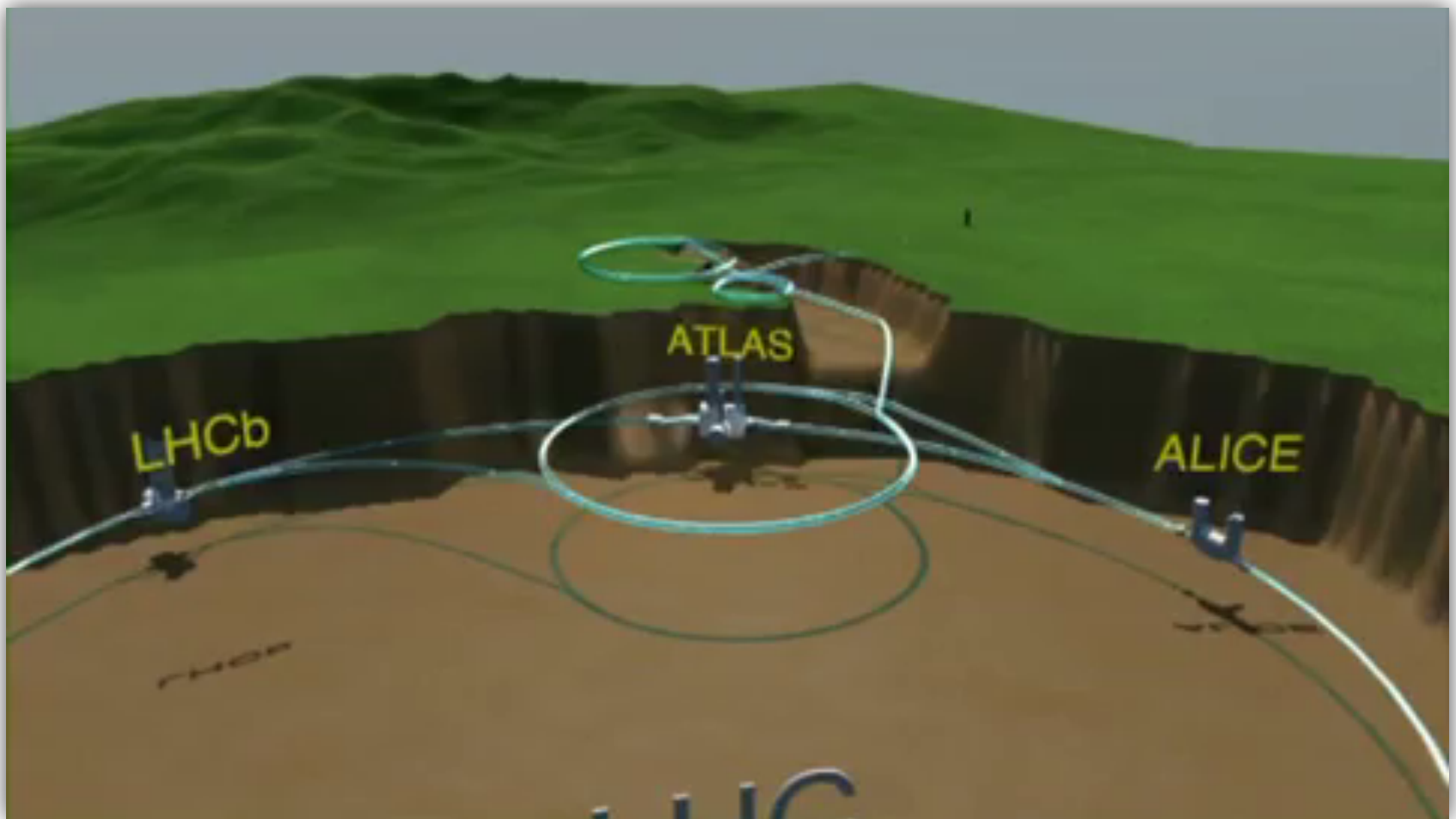Prof. António Onofre (Co-Advisor)

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- State of the Art

  - Heterogeneous Platforms

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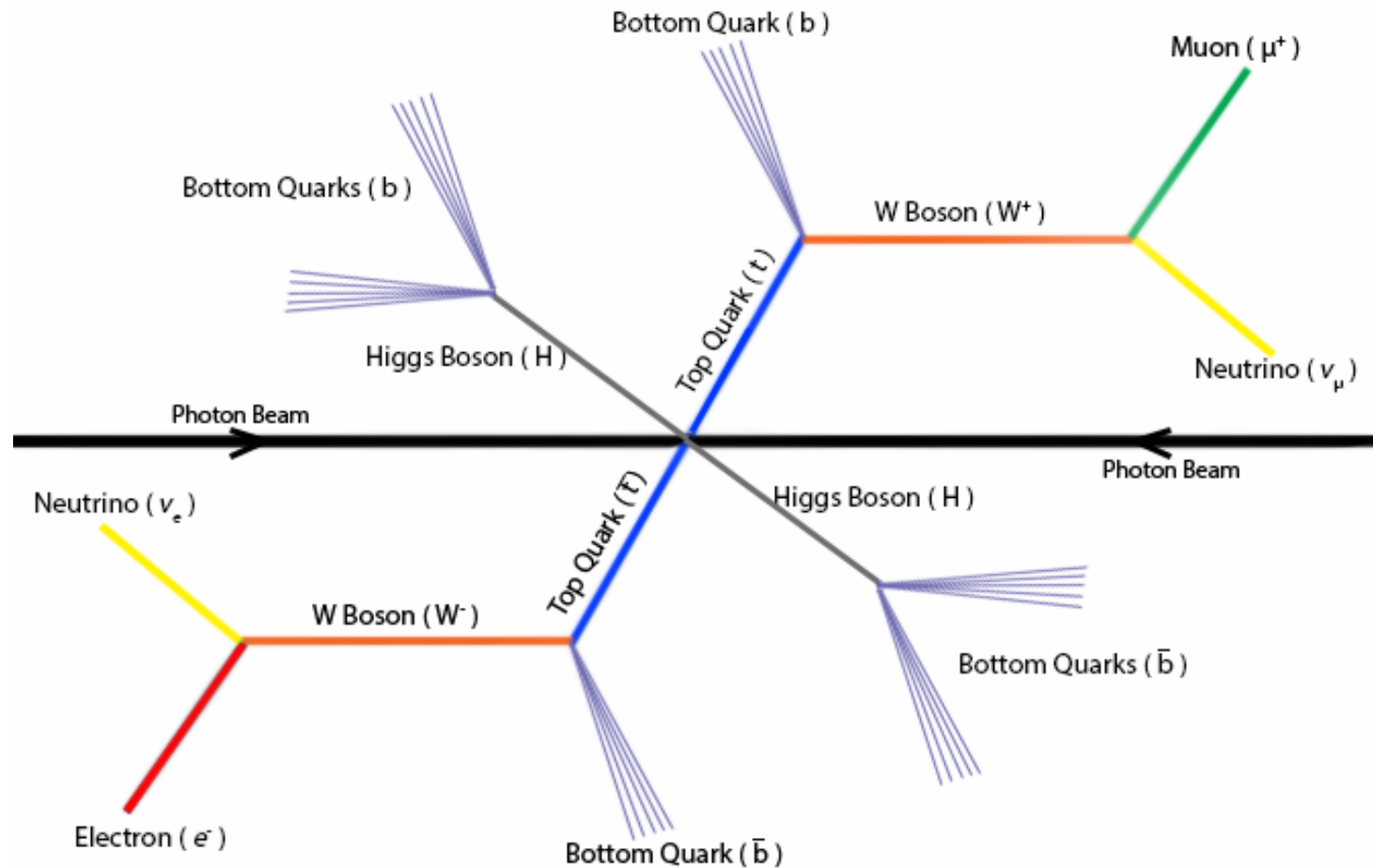
- The `ttH_dilep` Analysis Application
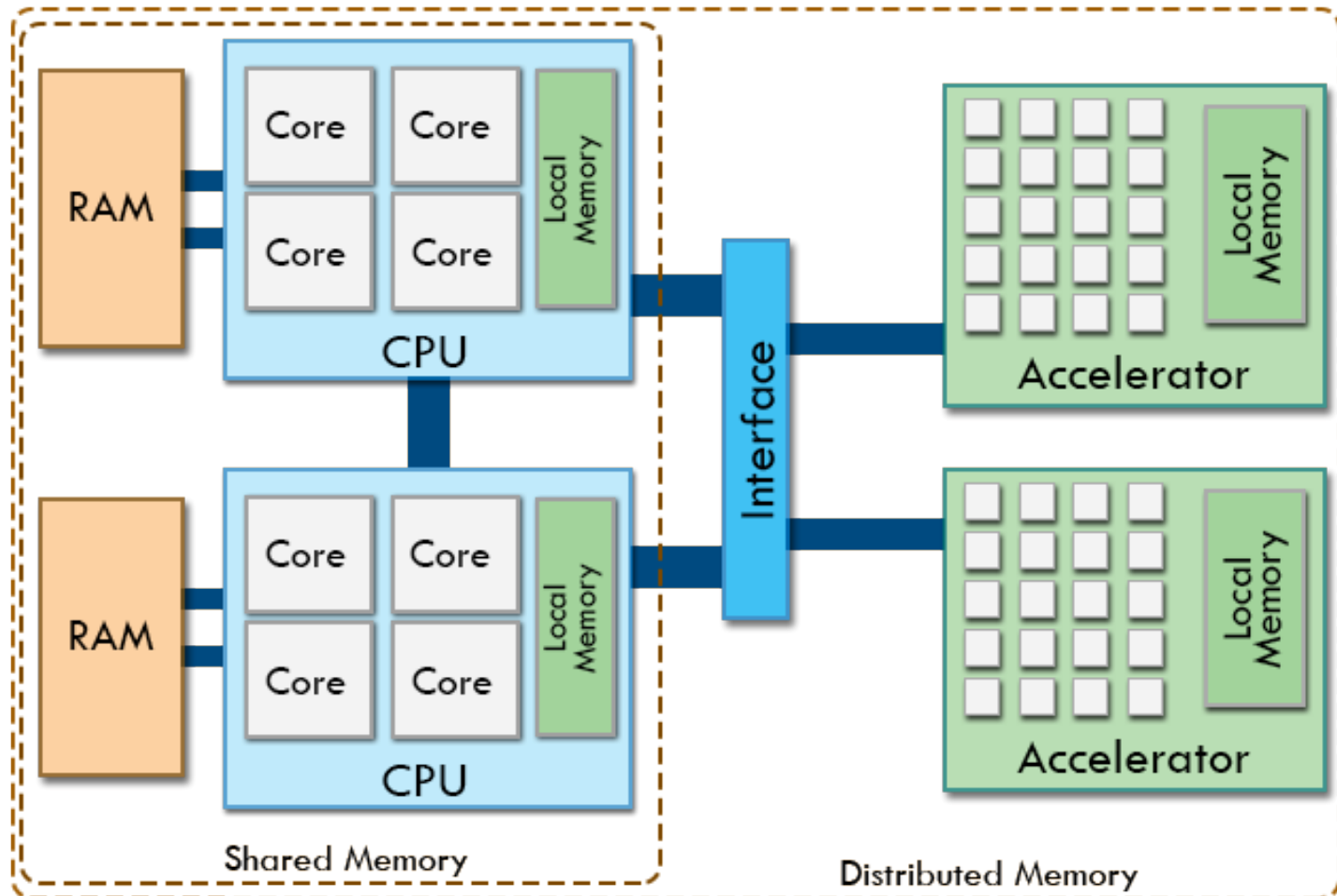
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Motivation

Motivation

ttbar system + Higgs decay

Heterogeneous Platforms

Heterogeneous Platforms

□ Several challenges
- ◘ Different architectures
- ◘ Different programming paradigms
- ◘ Load balancing
- ◘ Debugging

Accelerator Devices

- Usually based on the SIMD model

- **G**raphics **P**rocessing **U**nits architectures
  - NVidia Fermi
  - NVidia Kepler

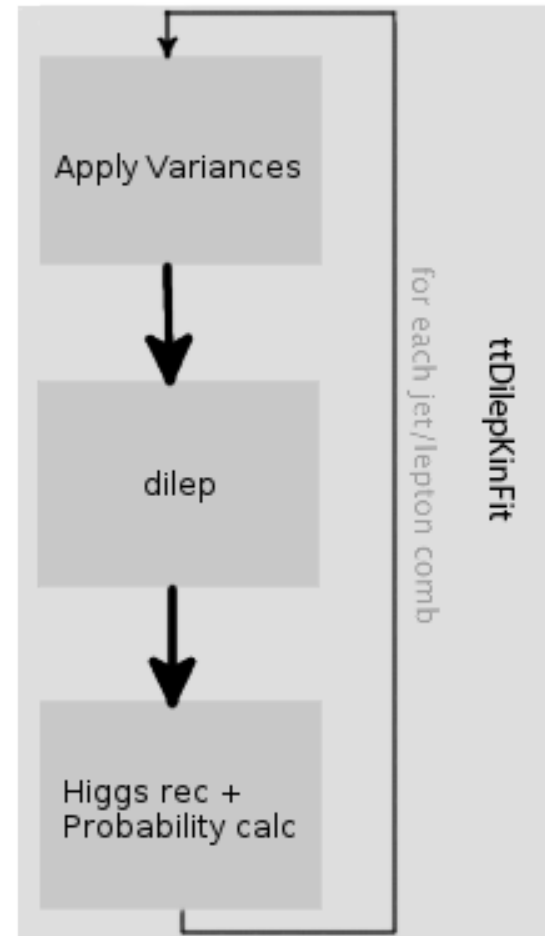- Intel **M**any **I**ntegrated **C**ore architecture
  - Intel Xeon Phi

Software

□ Available frameworks

◻ OpenMP (Homogeneous Platforms)

◻ OpenACC (Heterogeneous Platforms)

◻ GAMA (Heterogeneous Platforms only with GPUs)
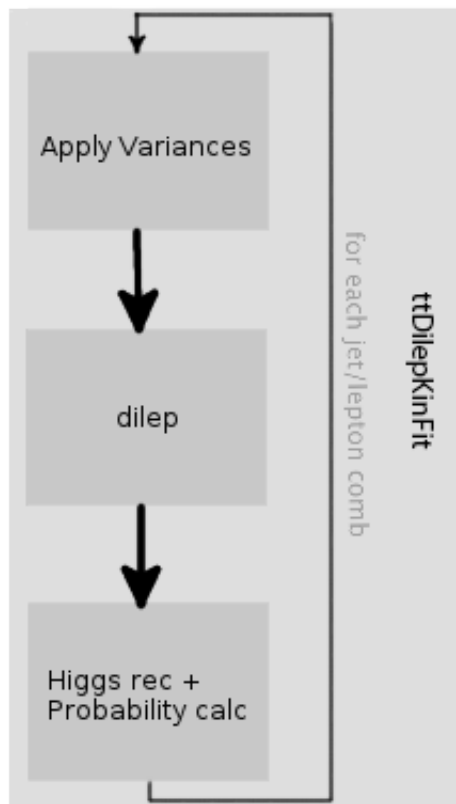
The `ttH_dilep` Analysis Application

- □ Series of filters applied to the events;

- □ Reconstruct the ttbar system and Higgs bosons;
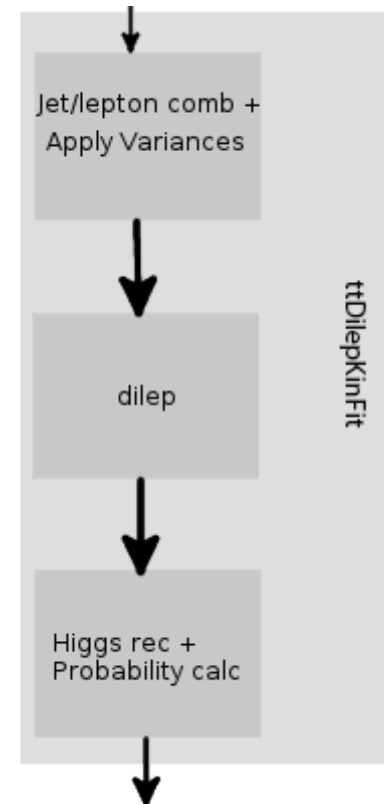 - ▣ Critical region: `ttDilepKinFit`

Future Work

Current

Proposed

Future Work

- Parallelization on heterogeneous platforms
  - Comparing accelerator devices
- OpenACC vs GAMA

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