Current and Future Work

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PP group meeting

The NA62 L0 Trigger

- The NA62 experiment will begin data taking in October 2014

- Expect ~10 MHz muons in the MUV3 detector (the Muon system)
- Write events to disk at $\mathcal{O}$(kHz): require a **highly selective trigger**

- The NA62 trigger is split into three stages:

- **L0 Trigger**: Hardware (FPGA). Input rate: 10MHz, Output rate: 1MHz
  - A **~ few 100 kHz** for **broad physics program**

- **L1 Trigger**: Software (Single detector). Output rate: ~100kHz
- **L2 Trigger**: Software (Full information). Output rate: ~ few kHz

The NA62 L0 Trigger

- **L0 Trigger**: Hardware (FPGA). Input rate: 10MHz, Output rate: 1MHz
  - A **~ few 100 kHz** for **broad physics program**

  - Primitives: What information should be taken from the detector?
    - R_{10}, Q_X = multiple tracks, M_2 = two coincident muons

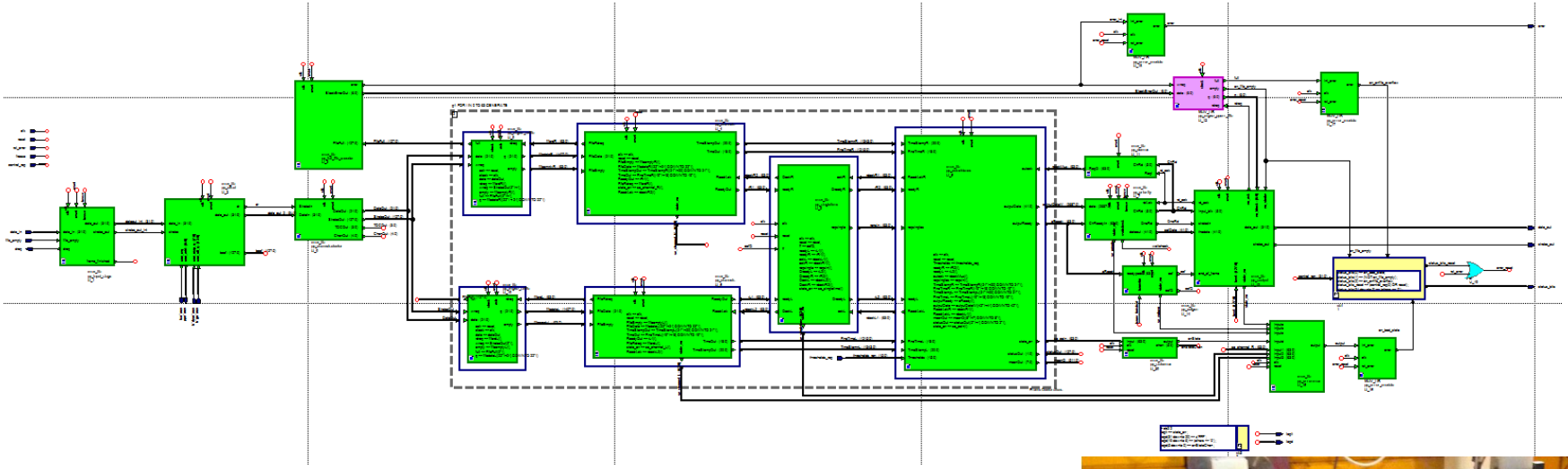
  - Trigger lines: What signatures should we trigger on? (combinations of primitives)
    - dimuon trigger: Two coincident muons, multiple tracks
      → $R_{10} * Q_X * M_2$

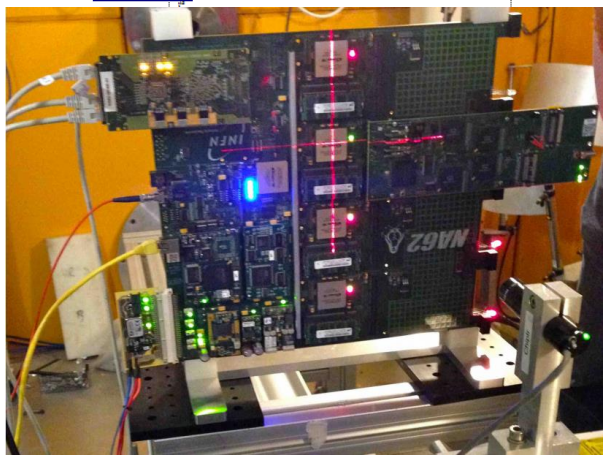
  - Downscaling: For minimum bias triggers

The NA62 L0 Trigger

- Have to compute the L0 primitives on hardware
  i.e. convert detector signals in MUV3 → M_1, M_2 primitives

- This is done using FPGA technology on a TEL62 board – Firmware





Future work 1

- **Commissioning** of the MUV3 firmware during the pilot physics run
  - Greater than 50% presence at CERN during the run

- **L1 Trigger**: Software (Single detector). Output rate: ~100kHz

- **L2 Trigger**: Software (Full information). Output rate: ~ few kHz

- **Physics analysis**, for example $K^+ \to \mu^+ \mu^+ \pi^-$