Contribution ID: **40** Type: **Pleanary**

The Trigger for the NA62 Experiment at CERN

Thursday 12 September 2013 12:15 (45 minutes)

The NA62 Experiment aims to measure the branching ratio of the ultra-rare kaon decay $K^+ \to \pi^+\nu\bar{\nu}$ with 10\% precision, collecting ~ 100 events in 2 years of data taking, starting in 2014. Assuming the value of the branching ratio as predicted by the SM ($BR(K^+ \to \pi^+\nu\bar{\nu}) = (8.5\pm0.7)\times10^{-11}$), to collect enough statistics a high-intensity kaon beam is needed. Besides the $K^+ \to \pi^+\nu\bar{\nu}$ decay, many other rare or forbidden kaon decays can be studied, given the required kaon flux ($\sim 10^{13}$). The highest intensity hadron beam available at CERN is a 800˜MHz unseparated secondary beam, in which the kaon component is only the 6\% (50˜MHz average). This results in a ~ 10˜MHz rate in the sub-detectors after the 65˜m long decay region.

In principle, the most flexible and unbiased way to readout sub-detector data would be using a "triggerless" acquisition system, in which all the data are unconditionally transferred to PCs. However, the NA62 high rate and channel count (~ 100000) make this choice infeasible. Therefore, a variety of hardware lowest-level (L0) triggers will be used to reduce the overall rate below ~ 1˜MHz but preserving most of the decays of interest. Following a L0 trigger, most sub-detectors will transfer data to dedicated PCs, where two trigger levels (L1 and L2) will be applied via software, to reach a final rate of ~ 10˜kHz.
In this talk the NA62 triggers and the relative rare decays selection algorithms will be described

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Session Classification: Session 14

Track Classification: Flavour Physics