IFAE 2017

NA62 High Level Trigger strategy

Marco Boretto on behalf of the **NA62** collaboration

NA62 is a fixed target experiment located at CERN Super Proton Synchrotron (SPS). NA62 is designed to measure the branching ratio of:

$$K^+ \to \pi^+ \nu\bar{\nu}$$

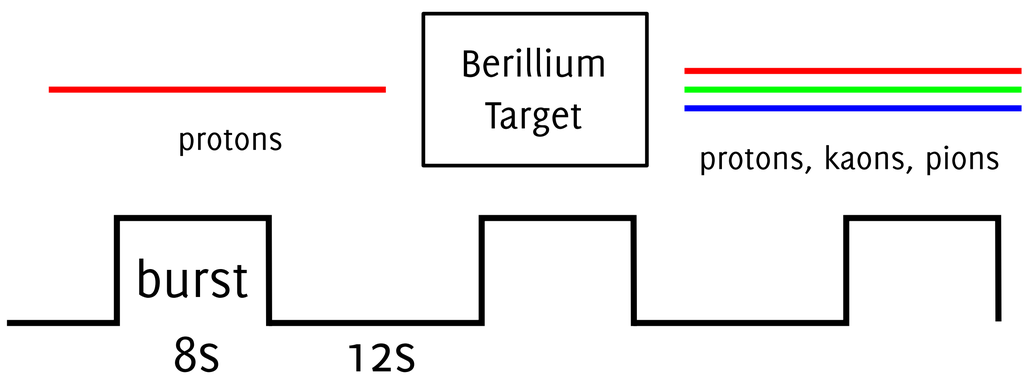
This decay is a neutral weak current with a quark flavor violation, highly suppressed by the GIM mechanism.
It is a strong indication of presence of new physics beyond the Standard Model.
The experiment goal is to measure the $K^+ \to \pi^+ \nu\bar{\nu}$ Branching Ratio (BR) with 10% of accuracy.

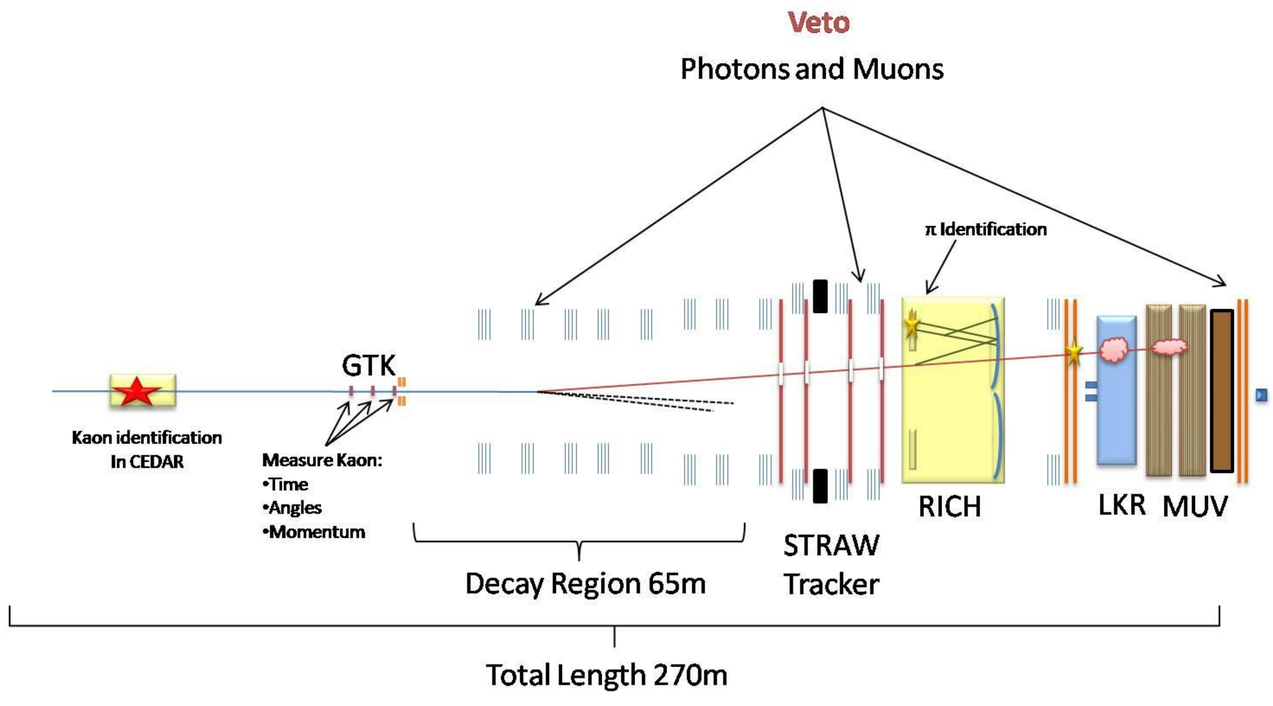
BR	Main **Kaons** decays mode
0.63%	$K^+ \to \mu^+ \nu$
0.21%	$K^+ \to \pi^+ \pi^0$
0.06%	$K^+ \to \pi^+ \pi^+ \pi^-$
	$\vdots$
$10^{-11}\%$	$K^+ \to \pi^+ \nu\bar{\nu}$

In order to measure this tiny branching ratio an high intensity kaons beam and a very efficient Trigger and Data Acquisition (TDAQ) chain is mandatory.

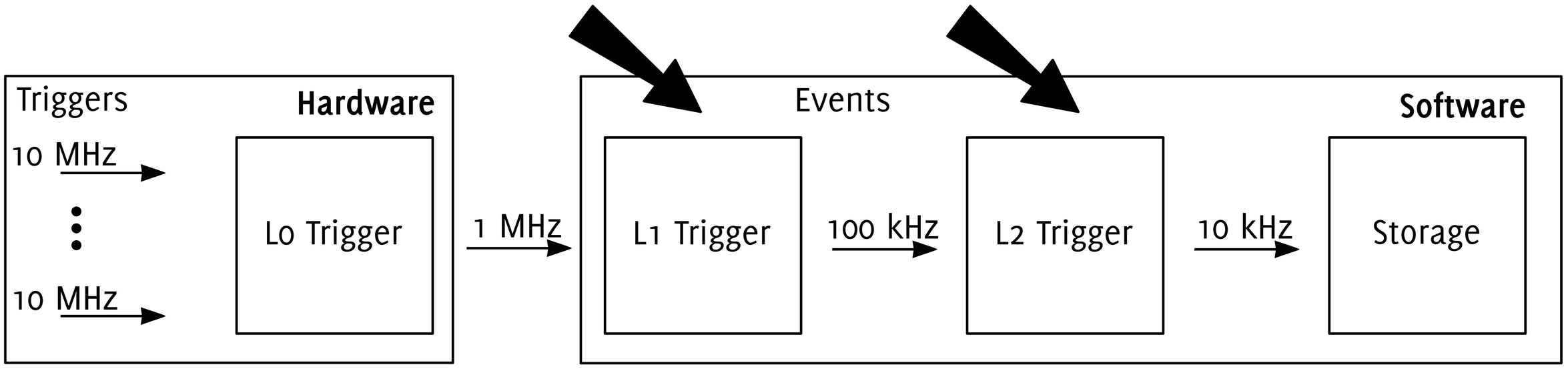
High intensity Kaons beam

Flux of protons rely on SPS cycle





The **multi-level** trigger system



Lo Hardware (real time) **Trigger**: Reduces the input rate from 10MHz to 1MHz. Latency 1ms
L1 Software Trigger: Algorithms exploit information from single detectors. Latency O(1)
L2 Software Trigger: Algorithms exploit information from all detectors. Latency O(1) (bust)