ID de Contribution: **47** Type: **Non spécifié**

NA62: New Opportunities in Rare Kaon Decays

mardi 10 mars 2009 10:25 (20 minutes)

There are three main directions in elementary particle physics. On the one hand experiments are made at the highest possible energies searching for the origin of electroweak breaking and direct evidence of New Physics (NP); a second line of attack aims to study the properties of the neutrinos, both of accelerator and cosmic origin, and of other astro-particle messengers. The third strategy is to explore the precision frontier looking for deviations from the Standard Model (SM) predictions in rare or forbidden processes. In this latter case, the sensitivity to NP originates from the virtual fluctuations that can involve all discovered and not yet discovered particles in higher order quantum loops and therefore can address, indirectly, energy scales even beyond those reachable at colliders. Some of the most interesting rare decays are those Flavour Changing neutral Currents (FCNC) that can be predicted with small hadronic uncertainty in the SM. There are only very few observables where sensitivity to NP and predictability within SM coexist. A very prominent example is given by the K –> pi nu nubar decays and it is precisely on this subject that the future CERN kaon physics strategy is being developed.

The CERN proton complex is unique. The Super Proton Synchrotron (SPS) will remain in operation for the foreseeable future as LHC injector. This injection task should occupy only a few hours per day, leaving the SPS available to send 400 GeV/c primary protons to fixed target experiments for the rest of the time.

I my talk I will present physics sensitivity of the NA62 experiment to study ultra-rare decays at the CERN-SPS and its present status.

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Classification de Session: Flavour physics: the future