

## **The CpFM: a high-sensitivity charged particles flux-monitor for accelerators physics**

The possible use of bent crystals for beam-manipulation in particle accelerators is currently investigated by the UA9 collaboration at CERN. One application could be the upgrade of collimation system for hadron colliders such as LHC - with an improved cleaning efficiency of the beam halo and a reduced impedance of the machine.

Investigation of this channeling process close to a circulating beam requires detectors which could be located inside the vacuum pipe itself. The CpFM – Cherenkov detector for proton Flux Measurements – is a calibrated detector fitting these requirements, with the aim of counting the mean number of deflected protons or ions at 43 Hz (1/1000 of the revolution frequency).

A first version of the CpFM has been developed at LAL and installed in the Super Proton Synchrotron (SPS) at CERN. This detector integrates Cherenkov light produced by relativistic charged particle penetrating a quartz radiator. The readout of the signal produced by the photodetector is performed by a WaveCatcher module integrated with the SPS DAQ. Calibration results obtained with this detector will be presented, as well as our conclusions and observed limitations after two years of operation.

In parallel, and after a first set of results, new requirements from the UA9 experiment triggered the development of a new detection chain, with an increased sensitivity able to resolve the single particle, and the ability to count the number of particles in every bunch (corresponding to a frequency up to 40 MHz). New geometries for quartz radiators have been simulated and tested, and a new detector fully calibrated, installed in SPS at the beginning of the year and providing excellent results and possibility to determine the number of deflected particles, in typically a range between 1 and several hundreds of protons per bunch. We'll present it, as well as future ways of optimization / improvement to fully comply with UA9 requirements or other projects.