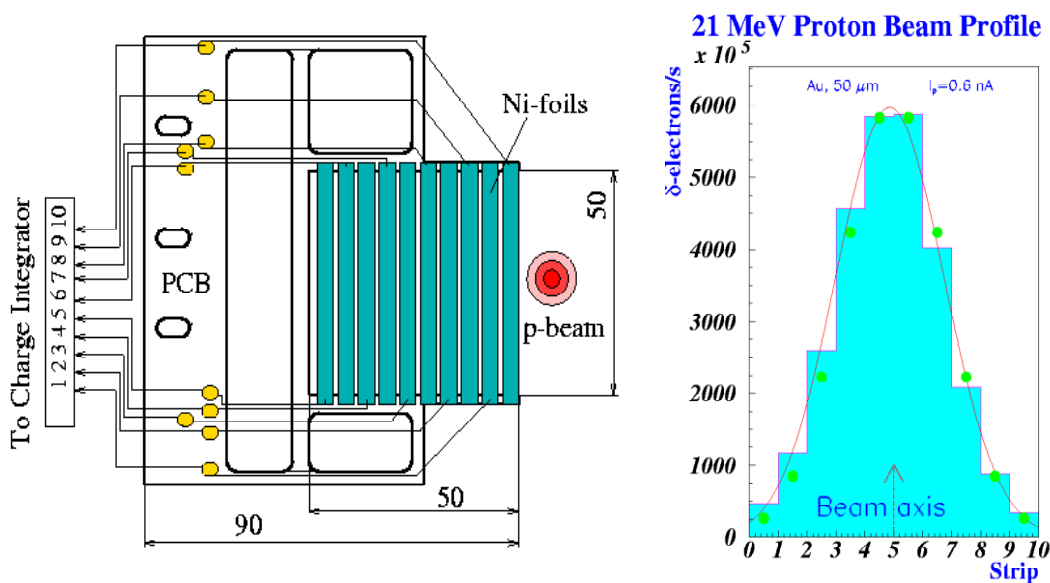


# High intensity beam diagnostics system based on novel metal micro-detectors

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Physics principle and production technologies have been developed at KINR for the new type detectors of the charged particles as well as synchrotron radiation – Metal Foil Detectors (MFD). Micro-strip MFDs – Micro-strip Metal Detectors (MMD) 0.5 – 1.0 micro-meter thick were used for the beam profile monitoring of the synchrotron radiation as well as for the charged particles: HERA-B Luminosity monitoring, LHCb Radiation Monitoring system, BPM for 21 MeV proton beam (tandem MPIfK), BPM for the LHCb (ST) test beam studies, 21 KeV, Synchrotron BPM at HASYLAB, 5 MeV Electron beam BPM at KINR, 150 KeV Synchrotron BPM at ESRF.



The current technology allows for production of the thin Ni-strips with a pitch of about few micrometers, providing high position resolution. The main technical features of the MMD: High Radiation tolerance ( $> 100$  MGy); Low thickness of sensors ( $\sim 1$   $\mu\text{m}$ ); Low operation voltage (20 V); Perfect spatial resolution (10  $\mu\text{m}$ ); Stable operation at X-ray intensity up to  $10^{16}$  photons $\cdot\text{s}^{-1}\cdot\text{mm}^{-2}$  and proton beam intensity up to  $10^{10}$  protons $\cdot\text{s}^{-1}\cdot\text{mm}^{-2}$ . Conversion factor of MMD – electrons/particle: ranges from 0.1 (for MIP) to few hundreds (for the fast Heavy Ion), noise – Determined by the connecting cable and readout electronics – ENC: 100 – 500 electrons. Metal detectors are suitable for measuring and imaging beams of charged particle in the energy range from KeV to TeV as well as synchrotron radiation.

In comparison with the latest developments in beam profile monitoring based on the silicon micro-strip or micro-pixel detectors Metal Micro-strip Detectors have an advantage of being extremely thin and semi-transparent device. MMD could be used as a feedback element for stabilizing and/or focusing charged particles beams.