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Test-beam and irradiation facility for high rates and occupancies with a LHC like beam frequency of 42.5 MHz at the 25 MeV proton cyclotron CYRCé at Strasbourg

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The IPHC (Institut Pluridisciplinaire Hubert Curien) has installed a specific beam line for tests and irradiation of detectors with the 25 MeV proton beam of the cyclotron CYRCé. The beam line is composed of standard beam line elements like quadrupoles and steerers and contains several beam diagnostic instruments. The beam leaves the vacuum chamber through a thin Al window, just in front of the experiment. Beam intensities range from 1 fA to maximal 100 nA. The Cyclotron delivers a pulsed beam with a frequency of 85 MHz, which will be divided at the source by an oscillating electrostatic field of 21.25MHz down to 42.5 MHz. The kicker will be commissioned in January 2020 and will allow combined detector and electronics operation at frequencies close to the LHC. An experimental setup has been developed to carry out detector and irradiation tests. It will also be adapted to allow for irradiation of sensors. The setup consists of two thin beam scintillators, a mechanical X-Y positioner for the DUT (Detector Under Test) and two reference planes of four CMS-Pixel-Phase-1 modules. This reference telescope allows to determine individual trajectories of protons with a spatial resolution of about 150 microns, mainly limited by multiple scattering. The telescope will be described in a separate contribution. Because the air could possibly be activated at higher beam intensities, an extraction system will create a small under-pressure of 20 Pascal in the setup.

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