

T592- MRPC and Reaction plane detector R&D for PHENIX experiment

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A R&D experiment has been carried out at T1 beam line at KEK-PS for a gaseous time-of-flight detector, Multi-gap Resistive Plate Chamber (MRPC) and a reaction plane detector with photo-multiplier tube (PMT). The both detectors will be used in the high energy heavy ion experiment (PHENIX) at Relativistic Heavy-Ion Collider (RHIC) at Brookhaven National Laboratory (BNL). The MRPC consists of several layers of glass and Freon gas mixture. The main purpose of this test is to find optimum operation conditions, especially on the additional quenching gas, iso-butane and sulphur hexa-fluoride (SF6). For the reaction plane detector, scintillation or Cherenkov radiators are examined as well as for the photon readout via solid light guide or wavelength shift fiber with PMT.

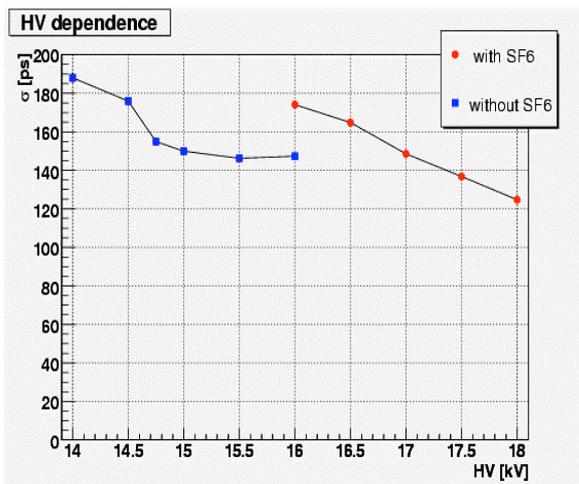


Figure.1 : HV dependence of timing resolution with different gas mixture

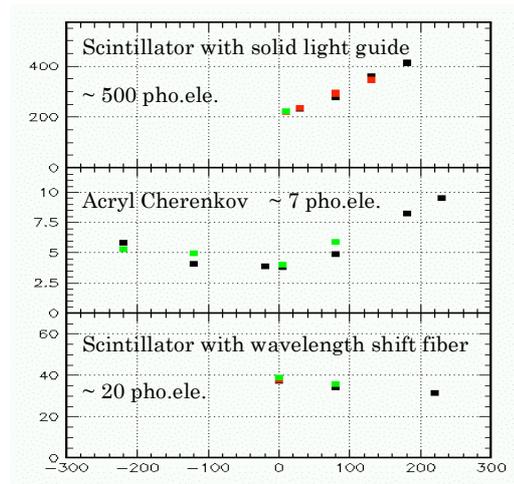


Figure.2 : position dependence of pulse height with different R.P. detector configurations

Figure.1 shows the high voltage dependence of timing resolution of MRPC with (red) or without (blue) SF6 gas. SF6 is known as a quenching gas to reduce the steamers, it is found to be able to operate the detector at avalanche mode at higher voltage than without SF6 and there seems to be an indication for further improvement of the timing resolution. Figure.2 shows the position dependence of pulse height for (top) scintillator with solid light guide, (middle) Acryl Cherenkov and (bottom) scintillator with wavelength shift fiber. A better uniformity is confirmed with fiber read-out, which will

be used in the real experiment at RHIC-PHENIX.