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Di-electron measurements with Hadron Blind Detector in the PHENIX experiment at RHIC

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The PHENIX experiment at the Relativistic Heavy Ion Collider (RHIC) is a large multipurpose experiment especially devoted to the measurement of rare probes, low mass dileptons in particular. The observation of spectral shape modifications of the vector mesons could provide direct information on the chiral symmetry restoration. However, the measurement of low mass electron pairs in the original PHENIX detector configuration is limited by a huge background from random combination of uncorrelated electron pairs. This background is dominated by π^0 Dalitz decays and γ conversions.

In order to address this issue a Hadron Blind Detector (HBD) has been developed as an upgrade of the PHENIX experiment. The HBD is a Cherenkov detector with a 50 cm long CF_4 radiator connected in a windowless configuration to a triple GEM coupled to pad readout and with a CsI photocathode layer evaporated on the top face of the GEM stack. The detector exploits the distinctive feature of the electron pairs from π^0 Dalitz decays and γ conversions, namely their very small opening angle. The HBD is therefore installed and operated in a field-free region in order to preserve the original emission direction of electrons. Those electron tracks identified in the PHENIX central arm detectors that have a hit in the HBD with double amplitude or have a nearby hit within a typical opening angle are rejected as likely partners of π^0 Dalitz decay or a γ conversion pair. The detector was successfully operated in the 2009 and 2010 RHIC runs, where large samples of p+p and Au+Au collisions at $\sqrt{s_{NN}}$ = 200 GeV were recorded. Di-electron results from the analysis of these data sets will be presented.