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Measurements of low mass di-electrons and low p_T direct photons in the PHENIX experiment at RHIC

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The PHENIX experiment at RHIC is suitable for measuring transparent probes such as electrons and photons, and they are powerful probes to investigate properties of the matter created in heavy ion collisions. Especially, the di-electron measurements provide us deep insight into the created matter. Recently, the low mass di-electron yield has been successfully measured in both p+p and Au+Au collisions. While the p+p result is well-understood as a combination of electron pairs from know hadronic sources, an enhancement of di-electron yield over the known hadronic sources is observed in Au+Au collisions in the low p_T region. The various efforts for developing models have been done in order to understand the enhancement of di-electron yield in low mass and low p_T region. But these models do not explain this enhancement fully yet. Furthermore, the fraction of the contribution from virtual direct photon decay can be determined from dielectron yield by focusing on the region which satisfies $p_T^2 \gg m_{ee}^2$. The real direct photon yield in p_T of 1-5 GeV/c has been obtained from the fraction of the virtual direct photon in p+p and Au+Au collisions. A significant excess over the binary scaled p+p result is seen in Au+Au collisions in this p_T region, where the primary contributor is considered to be thermal photons from QGP. Theoretical models which can reproduce our Au+Au result indicate that the initial temperature of the created matter is higher than the critical temperature of QGP (200 MeV). In this talk, the latest results on the di-electron and virtual direct photon measurements in p+p, p+A and A+A collisions at PHENIX will be presented.

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