Coherent ρ meson production in the STAR Ultra Peripheral Collisions program

(STAR Collaboration)
(Dated: February 6, 2013)

diffraction and azimuthal studies

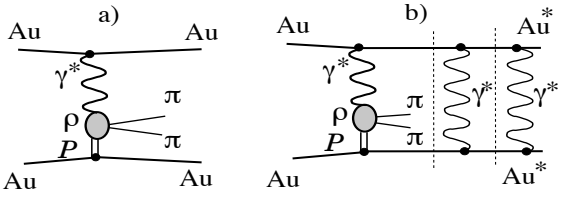

FIG. 1. event diagrams

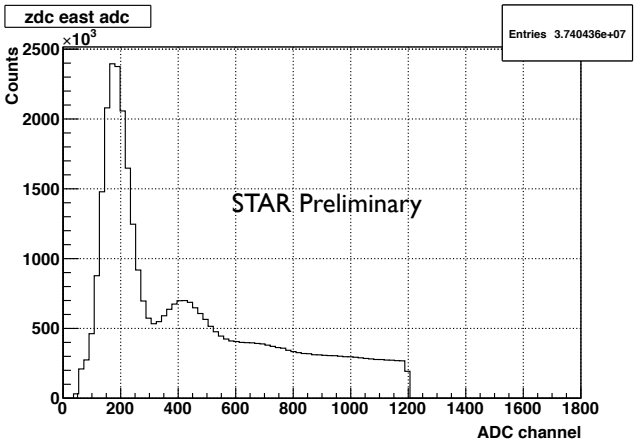

FIG. 2. Signal in one of the ZDC detectors.

I. INTRODUCTION

II. THE STAR DETECTOR

The data used for this analysis were collected with the STAR detector at RHIC from Au+Au collisions with center of mass energy per nucleon $\sqrt{s_{\rm NN}}$=200 GeV. The momentum of charged particles were detected with the STAR Time Projection Chamber (TPC) in two units of pseudo-rapidity centered around 0 ($|\eta| < 1$) and full azimuthal coverage. The TPC records up to 45 samples of the ionization left in the detector gas which allows for a good resolution particle identification based on energy loss. The charge left by particles inside the TPC drifts along its axis and is read out on the East and West sides which are divided into six sectors each. The TPC is also used to identify the vertex of the collisions and together with the bending power of the 0.5 Tesla magnetic field, it provides a momentum resolution equal to $\Delta p_T/p_T = 0.005 + 0.004 p_T$. More details about the TPC can be found in [1]. The cylindrical TPC is completely surrounded by the Time Of Flight (TOF) detector consisting of 23040 Resistive Parallel Plate gas detectors arranged in cells, groups of which form modules installed in two sets of trays along the East and West sides of the TPC, 10 TOF trays overlap the azimuth coverage of one TPC readout sector. The TOF detector was used to trigger the UPC events and provides good time-of-flight measurements, although this analysis doesn't make use of that information. STAR has two Zero Degrees Calorimeters (ZDC) installed at ±18 meters away from the nominal interaction point. These calorimeters are optimized for the detection of beam energy neutrons. These detectors are instrumental in the definition of the trigger used for this analysis, more details about them can be found in [2].

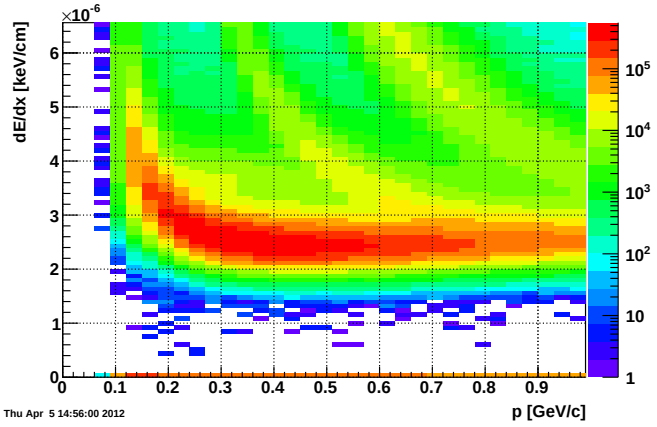

FIG. 3. Particle identification with energy loss in the TPC.

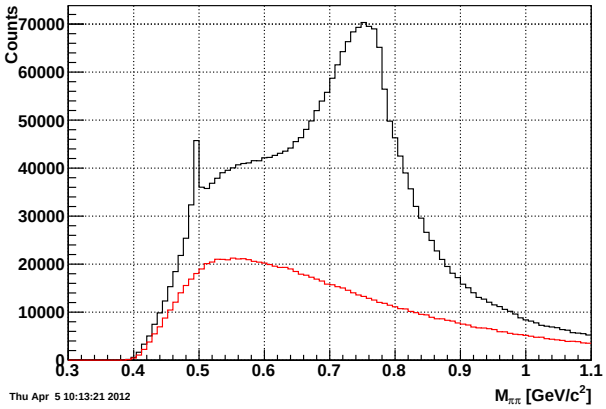

FIG. 4. from the WWND Proceedings

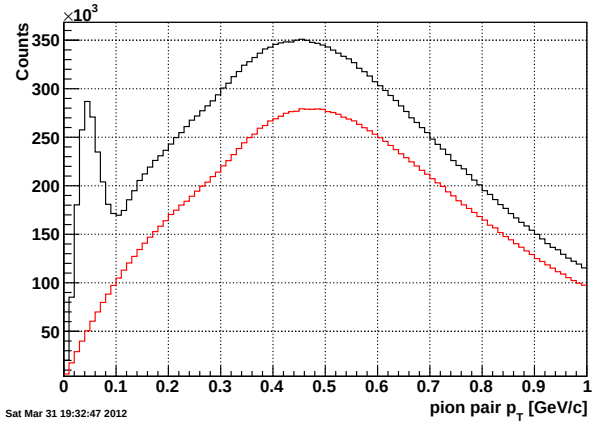

FIG. 5. from the WWND Proceedings

III. THE ρ MESONS RECONSTRUCTION

A. Reconstruction efficiency and detector acceptance

B. Normalization and reconstruction efficiencies

IV. EXTRACTION OF THE $d\sigma/dt$ DISTRIBUTION

V. AZIMUTHAL DISTRIBUTIONS

A. The ZDC Shower Maximum Detector

ACKNOWLEDGMENTS

Thanks

[1] M. Anderson *et al.*, Nuclear Instrum. Methods **A499**, 659 (2003).
[2] C. Adler, H. Strobele, A. Denisov, E. Garcia, M. Murray, *et al.*, Nucl.Instrum.Meth. **A461**, 337 (2001).

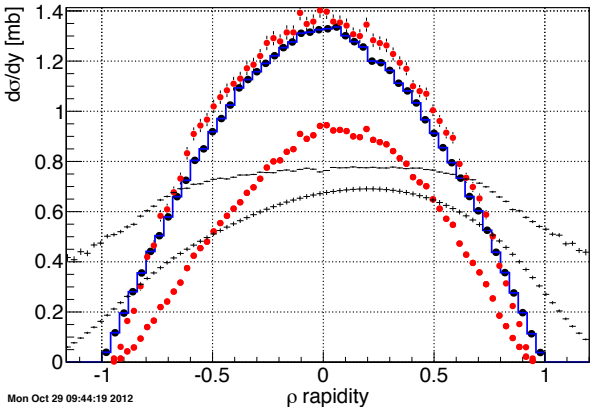

FIG. 6. Normalized rho rapidity distribution

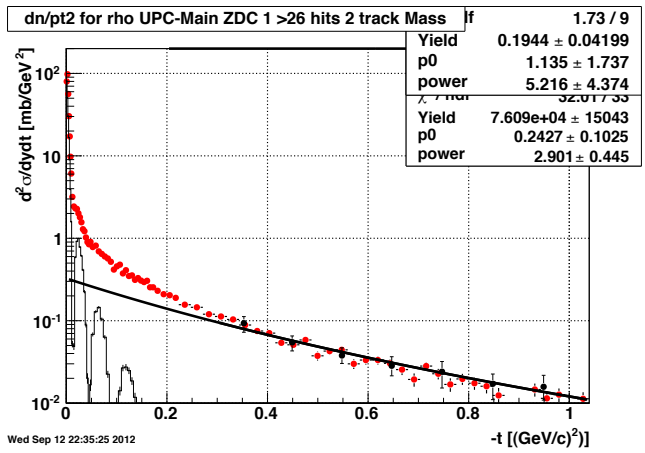

FIG. 7. from the WWND Proceedings

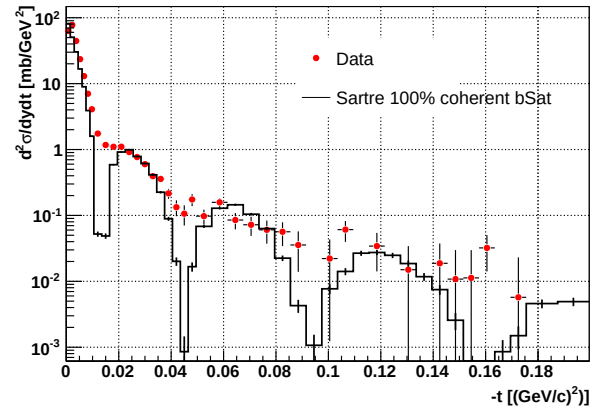

FIG. 8. from the WWND Proceedings

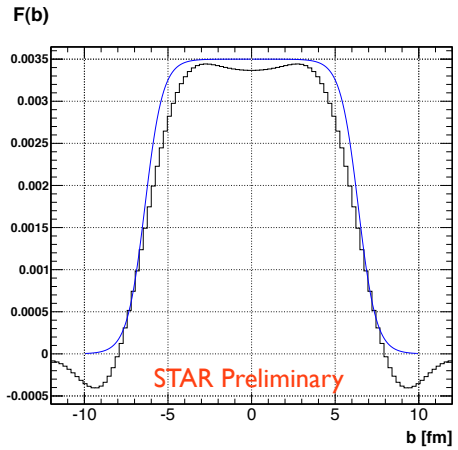

FIG. 9. Fourier transformation

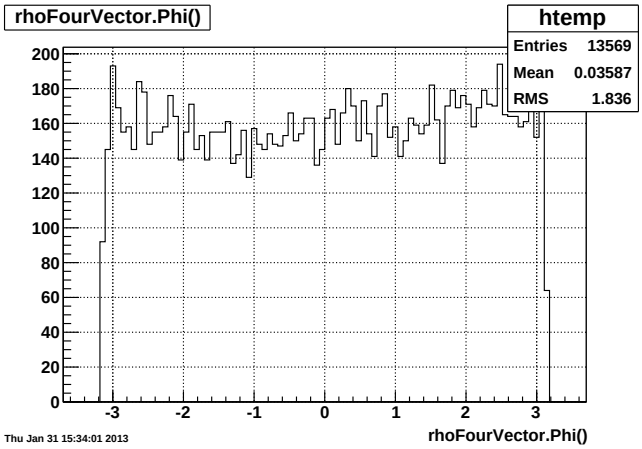

FIG. 10. Rho phi distribution

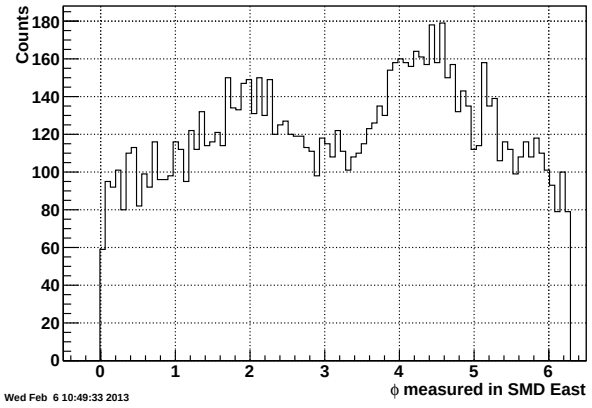

FIG. 11. SMD phi distribution East

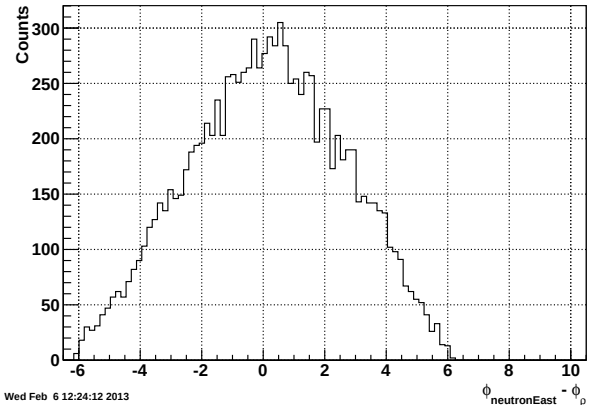

FIG. 12. delta phi East neutron - rho