RECENT RESULTS OF J/Ψ SUPPRESSION FROM THE NA50 EXPERIMENT AT CERN SPS

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New measurements have been performed by the NA50 Collaboration to study the J/Ψ production in Pb–Pb collisions at 158 GeV per nucleon in improved experimental conditions. The preliminary results confirm the threshold effect already observed in the past, i.e. a departure from the normal nuclear absorption (determined with greater precision using the most recent NA50 p–A data, together with NA38 and NA51 results) and a steady decrease for the most central collisions.

The latest NA50 data taking was performed with the aim of investigating the J/Ψ suppression in Pb–Pb interactions under improved experimental conditions. A vacuum system for the target region has been projected to avoid interactions of the Pb projectiles with the air around the target, which can produce a bias on the most peripheral points. Moreover a thin target (4 mm) was adopted, in order to reduce the probability to have reinteractions in the target of the secondary particles produced in the collision, which can bias the most central events. Data were collected with a 158 GeV/nucleon Pb beam at an intensity of $1 - 1.4 \cdot 10^7$ ions/s.

The $\sigma(J/\psi)/\sigma(DY)$ preliminary results of the standard NA50 analysis method [1] are presented in Fig. 1 as a function of two different centrality estimators, E_T and E_{ZDC}, measured respectively by the NA50 electromagnetic and zero degree calorimeters. Three independent analyses using E_T and one using E_{ZDC} have been performed in different laboratories collaborating to the NA50 experiment, using slightly different criteria of data selection and analysis methods. All the E_T analyses give consistent results

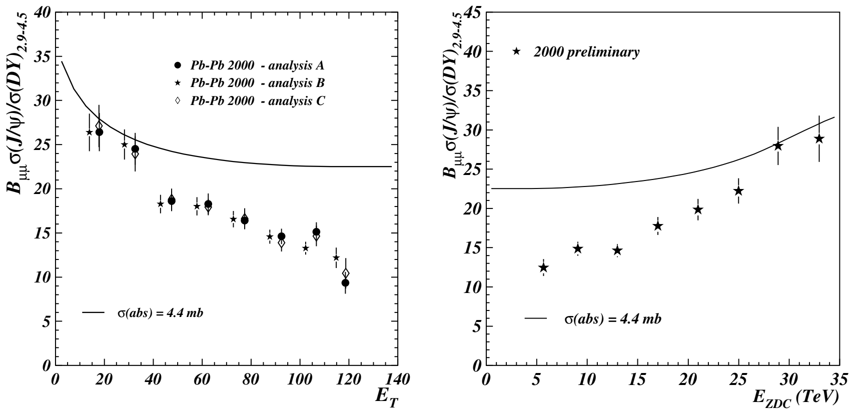

Figure 1. $\sigma_{J/\psi}/\sigma_{DY}$ ratio as a function of E_T (left) and E_{ZDC} (right).

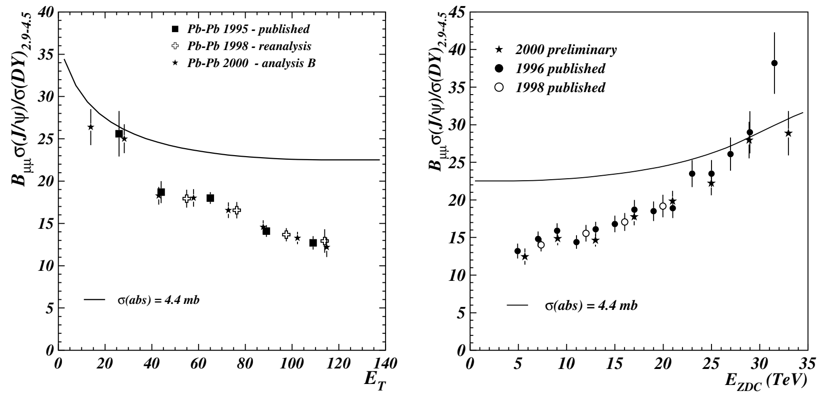

Figure 2. Comparison between the 2000 standard analysis results and previous NA50 results, as a function of E_T (left) and E_{ZDC} (right).

within few %. The red line represents the normal nuclear absorption reference, corresponding to a J/ψ absorption cross section of $4.4 \pm 0.5\,mb$. This value has been determined from the latest NA50 high statistics p–A results [2], together with the previous NA50, NA51 and NA38 p–p, p–A and S–U results [3,4,5]. The J/ψ production yield in peripheral collisions for all the analyses follows the normal absorption curve. A departure from this curve is observed at around $E_T \sim 40 GeV$ (or $E_{ZDC} \sim 27 TeV$) and no saturation is observed for the most central collisions (at high E_T or low E_{ZDC} values). This J/ψ suppression pattern can be understood in a deconfinement scenario, as resulting from the melting of different charmonium states, the J/ψ and the χ_c, which can more easily dissociate than the directly produced J/ψs.

In Fig. 2 the results of the 2000 data standard analysis are compared to the previous NA50 results: a good agreement can be observed both as a function of E_T and E_{ZDC}, except for the most peripheral collisions, which suffered in the past from the contamination of Pb–air interactions.

References

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