Session PS8: Heavy Ion Collisions

1- Laurent Capelli, Institut de Physique Nucleaire de Lyon, Villeurbanne, France.

Title: Recent results on J/ψ suppression in Pb-Pb collisions and on intermediate mass dimuom production.

Abstract: The analysis of the data collected by the Naso experiment in 1998, extends and clarifies the pattern of the previous observed J/ψ anomalous suppression. The new measurement, besides providing a deeper understanding of the previous observations, reveals a steady significative decrease in the J/ψ production rate up to the most central Pb-Pb collisions. The new observation leads to a global production rate pattern which finds its natural explanation in the framework of the formation of the deconfined state of quarks and gluons. In the other hand, the intermediate mass dimuon region between 1.6 and 2.5 GeV/c^2 has been studied. From p-A data we extract the charm cross section in good agreement with direct measurements. It is shown that the superposition of conventional processes, namely open charm and Drell–Yan, extrapolated from p-A is unable to describe the ion data. The excess increases roughly linearly wih the centrality of the collision.

2-R.K. Choudhury, Bhabha Atomic Research Center, Mumbai, India.

Title: PHENIX Experiment at RHIC.

The primary goal of the PHENIX experiment is to look for the signatures of the quark gluon plasma (QGP) formation, that is expected to occur at high energy densities and matter densities, during the heavy ion collisions at ultra-relativistic energies. The Relativistic Heavy Ion Collider(RHIC) at BNL will provide heavy ion beams upto gold with energies upto 200 GeV/nucleon in the centre of mass system (29.4 TeV total energy). The PHENIX experiment is being set up at RHIC and the detector has been designed to measure simultaneously the electrons, muons, photons and hadrons with very high efficiency and good momentum resolution. The PHENIX detector has two central arms and two muon arms, and consists of various detector elements such as tracking, RICH, dE/dx, time of flight detectors and calorimeters etc. to carry out the measurements over a large range of rapidity and momentum of the particles produced in the collisions. The various physics issues concerning the vector meson masses and their yields, strangeness and charm enhancement, jet quenching, thermal photon and di-lepton spectra, fluctuations and intermittancy in particle production etc. will be addressed by the PHENIX experiment. Apart from the heavy ion program, the PHENIX experiment also has a spin physics program with polarised p-p collisions to understand the spin structure of the nucleons. The present talk will give an overview of the detector and the physics programs to be studied by the

PHENIX experiment.

3- Sousa Dolores, Universidad de Santiago de Compostela, Spain.

Title: Strangeness enhancement in the string fusion model.

Abstract: A model for multiparticle production in nuclear collisions at ultrarelativistic energies is presented. Both hard and soft contributions are included. Collectivity is taken into account. Considering fusion of exchanged strings. Comparison with experimental data is performed. Multiplicity and transverse momenta distributions in a wide range of energies are reproduced. The string fusion leads to an enhancement of the strangeness poduction at about a 10 percent at SPS energies. However, the model underestimates Cascades and Omegas. Agreement with data is obtained by resacttering of final particles experimentally observed. Stoping is also reproduced.

4- Konstantin Kotelnikov, Lebedev Physical Institut, Moscow, Russia.

Title: Investigations of Central Pb-Pb Interactions at High Energies (I.M.Dremin, E.L.Feinberg, L.A.Goncharova, S.A.Kalinin, K.A.Kotelnikov, A.G.Martynov, V.A.Nechitailo, N.G.Polukhina).

Abstract: The data of experiment EMU-15, which emulsion chambers were irradiated by a beam of atoms lead nuclei with energy 33 TeV/nucleus, are reported. The chamber targets with thickness of 300 microns and nuclear emulsion layers with thickness of emulsion equal to 50 microns, were placed perpendiculary to beam of nuclei. Analysis of 5 central events, processed up to now, specify existence of peculiarities in the secondary charged particle distribution. Methods of the pattern recognition theory, in particular, wavelet technique (method of the localized spectral analysis), used at the analysis of the experimental material, reveal the detailed features of such peculiarities.

5- Volodymyr Magas, University of Bergen, Bergen, Norway.

Title: Structure of elliptic flow and initial conditions for hydrodynamical calculations.

Abstract: The model for calculations of energy, pressure and flow velocity distributions at the very beginning of the relativistic heavy ion collisions will be presented. The results are supposed to be used as an initial conditions for the hydrodynamical calculations. The results of calculations show that QGP form a tilted disk, such that the direction of the largest pressure gradient stays in reaction plane, but deviates from the both beam and transverse directions. Such initial conditions may lead to creation of third flow component.

6- Feng Pan, Liaoning Normal University, Dalian, China.

Title: A New Dibaryon $(\Omega^-\Omega^-)_{J^\pi=0^+}$ predicted by the chiral $SU(3)$ quark model (L. R. Dai, F. Pan (Liaoning), Z. Y. Zhang, Y. W. Yu (Beijing)).

Abstract: The structure of a new dibaryon $(\Omega\Omega)_{0^+}$ is studied and predicted in the framework of the chiral SU(3) quark model by solving a resonating group method (RGM). The binding energy of this dibaryon is around 100 Mev, the mean square root of the distance between two Ω is 0.84 fm and the preliminary estimated mean life time is about two times that of the free Ω. All these interesting properties, and also the two negative charge units it carries could make it easily identified experimentally in the heavy ion collision process. The production probability of this new dibaryon in 158A Gev Pb+Pb collision is estimated using the thermal model, which is of the order of 10^{-6} to 10^{-5} per event. It is expected that with the increase of the temperature, the production rate will also be increased.

7- Susumu Sato, University of Tsukuba, Ibaraki, Japan.

Title: Characteristics in heavy ion collision at 158 AGeV Pb + Pb collisions.

Abstract: In the heavy ion collision with 158 AGeV Pb + Pb system, hadron and photon spectrum with global valuables like charged and nutral particle multiplycities are measured. In the heavy ion collisions, very high multiplicy (dNch/dy 400) is achieved. In such collision environments, collective motions of hadrons both at mid rapidity and at target rapidity are measured. The particle identification enables observation of collectivity for K-mesons, too. Contribution of resonance, like delta, to the particle production in high multiplicity environments is also measured. The multiplicity ratio between charged and neutral particles, and the high-pt photon measurement are also studied.

8- Tran Huu Phat, Vietnam Atomic Energy Commission, Hanoi, Vietnam.

Title: On The High Temperature Non-Restoration of Chiral symmetry.

Abstract: We investigate the possibility of chiral symmetry non-restoration at high temperature in a model where this symmetry is spontaneously broken at zero temperature. We found that in the sigma model which includes a singlet field, the high temperature non-restoration of chiral symmetry occurs for a wide range of parametres of the model.

9- Olivier Drapier, Institut de Physique Nucléaire de Lyon, France.

Title: Study of Heavy Ion Collisions with the CMS Detector

Abstract: In this presentation, I report on the suitability of the CMS (Compact Muon Solenoid) de-

tector for the study of heavy ion collisions at the CERN Large Hadron Collider (LHC). This detector, designed for pp LHC physics, can be used for the search for the phase transition from nuclear matter to a quark-gluon plasma predicted by lattice QCD calculations. In particular, the production of the Υ family mesons and the characteristics of the jets emitted in the interactions can be measured as a function of the collision impact parameter for different incident nuclei.

10- Peter Sonderegger, CERN, Switzerland.

Title: NA60: a last SPS Heavy Ion Experiment, and Test Bench for LHC Detectors.

Abstract: The recently approved NA60 experiment is meant to solve outstanding problems in Heavy Ion dimuon physics at the SPS : Open Charm, Thermal Dileptons, and confirmation of J/Psi and Psi' Suppression. The NA10/38/50 dimuon spectrometer will be completed by a compact vertex spectrometer, which will recognize and measure the muons before they enter the absorber. New LHC-class detectors will be intensively used. The beam ions will be tracked by cryogenic Si microstrips, and the few hundred secondary particles by pixel detectors produced in commercial submicron technology. These will be exposed, in 2002/3, to weekly radiation doses similar to the doses which will hit the major LHC pixel detectors in a year.