HK 26: Physik mit schweren Ionen

Zeit: Mittwoch 11:15–12:30 Raum: F

HK 26.1 Mi 11:15 F

Energy Dependence of Multiplicity Fluctuations in Heavy Ion Collisions — •Benjamin Lungwitz[1], Christopher Alt[1], Alexandra Argyrakis[1], Christoph Blume[1], Peter Dinkelaker[1], Volker Friese[2], Marek Gazdzicki[1], Claudia Höhne[2], Michael Kliemant[1], Stefan Kniege[1], Dmytro Kresan[2], Michael Mitrovski[1], Rainer Renfordt[1], Tim Schuster[1], Reinhard Stock[1], Claudia Strabel[1], Herbert Ströbele[1], Millica Utvic[1], Alexander Wetzler[1], and Dmytro Kresan[2] for the NA49-Collaboration — [1]Fachbereich Physik der Universität Frankfurt — [2]Gesellschaft für Schwerionenforschung (GSI), Darmstadt

The energy dependence of multiplicity fluctuations was studied for the most central $Pb + Pb$ collisions at $20A$, $30A$, $40A$, $80A$ and $158A$ GeV by the NA49 experiment at the CERN SPS. The multiplicity distribution for negatively and positively charged hadrons is significantly narrower than Poisson one for all energies. No significant structure in energy dependence of the scaled variance of multiplicity fluctuations is observed. The measured scaled variance is lower than the one predicted by the grand-canonical formulation of the hadron-resonance gas model. The results for scaled variance are in approximate agreement with the string-hadronic model UrQMD.

HK 26.2 Mi 11:30 F

Multiplicity fluctuations in relativistic nuclear collisions: statistical model versus experimental data — Victor Begun[1,2], Marek Gazdzicki[3,4], Mark Gorenstein[2,5], •Michael Hauer[6,7], Volodya Konchakovski[2,6], and Benjamin Lungwitz[3] — [1]Museo Storico della Fisica e Centro Studi e Ricerche Enrico Fermi, Rome, Italy — [2]Bogolyubov Institute for Theoretical Physics, Kiev, Ukraine — [3]Institut für Kernphysik, University of Frankfurt, Frankfurt, Germany — [4]Swicetokrzyska Academy, Kielce, Poland — [5]Frankfurt Institute for Advanced Studies, Frankfurt,Germany — [6]Helmholtz Research School, University of Frankfurt, Frankfurt, Germany — [7]University of Cape Town, Cape Town, South Africa

The multiplicity distributions of hadrons produced in central nucleus-nucleus collisions are studied within the hadron-resonance gas model in the large volume limit. The multiplicity distributions and the scaled variances for negatively, positively, and all charged hadrons are calculated along the chemical freeze-out line of central Pb+Pb (Au+Au) collisions from SIS to LHC energies. Predictions obtained within different statistical ensembles are compared with the preliminary NA49 experimental results on central Pb+Pb collisions in the SPS energy range. The measured fluctuations are significantly narrower than the Poisson ones and clearly favor expectations for the micro-canonical ensemble. Thus this is a first observation of the recently predicted suppression of the multiplicity fluctuations in relativistic gases in the thermodynamical limit due to conservation laws.

HK 26.3 Mi 11:45 F

Kinematical properties of fragmentation residues — •Antoine Bacquias — GSI, Darmstadt, Germany

The width of momentum distributions of fragmentation residues is important for the design of hybrid reactors ADS and for radioactive beam production. Predictions commonly used for the features of longitudinal momentum distributions are Morrissey systematic and Goldhaber model. Morrissey formula is only valid for small mass losses and does not fit the data over the whole mass range. Goldhaber model relies on a physical description which is not complete. We propose a model which is based on abrasion as described by Goldhaber, but also includes other features of the reaction (evaporation of nucleons and light fragments, multifragmentation). It contains a more complete physical ground and gives satisfactory predictions over the whole mass range covered by observed fragments.

Using FRS, a high resolution magnetic spectrometer, fragments from heavy ions collisions are fully identified, both in mass and nuclear charge. Furthermore, longitudinal velocities are measured with a relative precision around $5 \cdot 10^{-4}$. We will compare our model with these data, from light fragments to the projectile.

HK 26.4 Mi 12:00 F

New Experimental Approach for Isochronous Mass Measurements at the FRS-ESR Facility — •Ronja Knöbel[1,2], Hans Geissel[1,2], Sergey Litvinov[1,2], Yuri Litvinov[1,2], Baohua Sun[1,3], Karl Beckert[1], Peter Beller[1], Fritz Bosch[1], David Boutin[1,2], Carsten Brandau[1], Lixin Chen[1,2], Christina Dimopoulou[1], Benjamin Fabian[2], Marc Hausmann[4], Otto Klepper[1], Christophor Kozhuharov[1], Jan Kurcewicz[1], Marco Mazzocco[1], Fernando Montes[1], Gottfried Münzenberg[1], Agatino Musumarra[5], Chiara Nociforo[1], Fritz Nolden[1], Wolfgang Plass[2], Christoph Scheidenberger[1,2], Markus Steck[1], Helmut Weick[1], Nicolas Winckler[1,2], and Martin Winkler[1] — [1]GSI, Darmstadt,Germany — [2]II. Physikalisches Institut,Justus-Liebig-Universität, Gießen, Germany — [3]Peking University, Beijing,China — [4]Michigan State University, East Lansing,USA — [5]INFN-LNS Catania, Italy

At GSI the combination of the fragment separator FRS and the cooler-storage ring ESR is used to perform high accuracy mass and lifetime measurements of exotic nuclei. Operating the ESR in the isochronous mode allows measurements of the masses of exotic nuclei with half-lives down to several ten microseconds. By additional determination of the magnetic rigidity at the dispersive midplane of the FRS the mass resolving power could be significantly improved. A recently performed experiment with neutron-rich fission fragments will give access to new masses and therefore important information for investigations in nuclear structure and astrophysics.

HK 26.5 Mi 12:15 F

SHIPTRAP - Auf dem Weg zu Massenmessungen der schwersten Elemente — •Frank Herfurth und SHIPTRAP Kollaboration — GSI Darmstadt, 64291 Darmstadt, Germany

Die schwersten Elemente, nur aufwendig im Labor herstellbar, existieren nur aufgrund des komplexen Zusammenspiels der Kräfte im Atomkern. Eine genaue Messung der Eigenschaften der Transurane liefert deshalb einen direkten Zugang zum Verständnis der kernphysikalischen Zusammenhänge. Das Penningfallenspektrometer SHIPTRAP wurde an der GSI in Darmstadt aufgebaut um die Grundzustandseigenschaften der schwersten Kerne präzise zu vermessen. Zuerst steht die Masse im Fokus der experimentellen Bemühungen. Das SHIPTRAP Experiment wurde im Laufe der letzten zwei Jahre erfolgreich in Betrieb genommen. Die Massen von mehr als 50 mittelschweren Kernen wurden mit einer relativen Genauigkeit von 10^{-8} vermessen. Darunter ist ^{147}Tm, ein Kern der jenseits der Protonenabbruchkante liegt und via Protonenemsission zerfällt. Der Sn-Sb-Te Zyklus markiert den Endpunkt des astrophysikalischen rp-Prozesses. Einige Nuklide in dieser Region konnten erstmals gemessen werden und bilden damit einen Teil der Basisdaten für zuverlässige Berechnungen. Die aktuellen Ergebnisse werden vorgestellt und der Weg zu den ersten direkten Messungen von Kernen jenseits von Fermium aufgezeigt.