[3] G. Verde et al., Physics Letters B 653 (2007) 12

[4] W.P Tan et al., Physical Review C 69 (2004) 061304, F. Grenier et al., Nuclear Physics A 811 (2008) 233

HK 7.5 Mo 15:15 H-ZO 50

High-Density Symmetry Energy in Heavy Ion Collisions* — Vaia Prassa[1], Theodoros Gaitanos[2], Graziella Ferini[3], Maria Colonna[3], Massimo Di Toro[3], Vincenzo Greco[3], and •Hermann Wolter[4] — [1]Univ. of Thessaloniki, Greece — [2]Inst. Theor. Physics, Univ. Giessen, Germany — [3]INFN; Lab. Naz. del Sud, Catania, Italy — [4]Univ. of Munich, Munich, Germany

The density dependence of the nuclear symmetry energy is an issue of great current interest with respect to exotic nuclear structure, heavy ion collisions, neutron stars and supernovae. However, there are large differences in the predictions of theoretical models and rather few experimental constraints. This is particularly true for the symmetry energy at densities above saturation. Generally the symmetry energy is small relative to the bulk energy, and thus one has to rely on differences and ratios of observables. We discuss predictions for possible observables in relativistic heavy ion collisions, which have the potentiual of constraining the high density symmetry energy: (1) proton/neutron and light cluster flow and pre-equilibrium emission, and (2) pion and kaon production, especially yield ratios. We will particularly discuss the robustness of the predictions.

*Supported in part by DFG Cluster of Excellence "Origin and Structure of the Universe"

HK 7.6 Mo 15:30 H-ZO 50

Chiral Effective Field Theory for Nuclear Matter — •Andre Lacour[1], Jose Antonio Oller[2], and Ulf-G. Meissner[1,3] — [1]Helmholtz-Institut für Strahlen- und Kernphysik (Theorie), Universität Bonn, Nußallee 14-16, D-53115 Bonn, Germany — [2]Departamento de Fisica. Universidad de Murcia. E-30071 Murcia, Spain — [3]Forschungszentrum Jülich, Institut für Kernphysik (Theorie), D-52425 Jülich, Germany

A novel chiral power counting for nuclear matter with nucleons and pions as degrees of freedom will be presented. This allows for systematic expansion taking into account both local as well as pion-mediated inter-nucleon interactions. It also identifies some non-perturbative string of diagrams, related to NN initial and final state interactions, to be resummed. We have applied this power counting to the pion self-energy in asymmetric nuclear matter.

HK 7.7 Mo 15:45 H-ZO 50

Relativistic random-phase approximation with density-dependent meson-nucleon couplings at finite temperature — •Yifei Niu[1,2], Nils Paar[2], Dario Vretenar[2], and Jie Meng[1] — [1]State Key Lab Nucl. Phys. & Tech., School of Physics, Peking University, Beijing 100871, China — [2]Physics Department, Faculty of Science, University of Zagreb, Zagreb 10000, Croatia

The fully self-consistent relativistic random-phase approximation (RRPA) framework based on effective interactions with a phenomenological density dependence is extended to finite temperatures. The RRPA configuration space is built from the spectrum of single-nucleon states at finite temperature obtained by the temperature dependent relativistic mean field (RMF-T) theory based on effective Lagrangian with density dependent meson-nucleon vertex functions. As an illustration, the dependence of binding energy, radius, entropy and single particle levels on temperature for spherical nucleus ^{208}Pb is investigated in RMF-T theory. The finite temperature RRPA has been employed in studies of giant monopole and dipole resonances, and the evolution of resonance properties has been studied as a function of temperature. In addition, exotic modes of excitation have been systematically explored at finite temperatures, with an emphasis on the case of pygmy dipole resonances.

HK 8: Astroparticle Physics

Time: Monday 14:00–16:00 Location: H-ZO 70

Invited Group Report HK 8.1 Mo 14:00 H-ZO 70

Chasing theta-13 with the Double Chooz experiment — •Thierry Lasserre — CEA/DSM/IRFU/SPP, 91191 Gif-s-Yvette, France

Neutrino oscillation physics is entering a precision measurement area. The smallness of the theta-13 neutrino mixing angle is still enigmatic and should be resolved. Double Chooz will use two identical detectors near the Chooz nuclear power station to search for a non vanishing theta-13, and hopefully open the way to experiments aspiring to discover CP violation in the leptonic sector.

Group Report HK 8.2 Mo 14:30 H-ZO 70

Suche nach solaren Axionen mit dem CAST-Experiment — •Julia Vogel, Horst Fischer, Jürgen Franz, Elisabeth Gruber, Tillmann Guthörl, Donghwa Kang und Kay Königsmann für die CAST-Kollaboration — Albert-Ludwigs-Universität Freiburg

Das CERN Axion Solar Telescope (CAST) sucht nach solaren Axionen, die im Kern der Sonne durch den sogenannten Primakoff-Effekt erzeugt werden. Dazu verwendet CAST einen LHC Prototyp-Magneten, in dessen 9 Tesla starkem Feld Axionen in Röntgenphotonen im keV-Bereich umgewandelt werden könnten. Der Magnet kann der Sonne jeden Tag für insgesamt etwa 3 h nachgeführt werden.

Die Analyse der Daten, die mit Vakuum im Magneten während der ersten Phase des Experiments aufgenommen wurden, lieferte die bisher beste experimentelle Obergrenze auf die Axion-Photon-Kopplungskonstante $g_{a\gamma}$ für Axionmassen m_a bis etwa 0.1 eV. Um die Sensitivität des Experiments auf einen höheren Massenbereich auszudehnen, hat CAST die Suche nach Axionen mit Helium im Magneten fortgesetzt. Für einen festen He-Druck ist die Kohärenz zwischen Axionen und Photonen bei einer bestimmten Axionmasse erfüllt und man erreicht eine maximale Sensitivität. Im ersten Teil dieser zweiten Phase, bei dem ^{4}He-Gas verwendet wurde, konnte der Massenbereich bis 0.39 eV abgedeckt werden und das Experiment dringt in von Axionmodellen bevorzugte Regionen im Axion-Phasenraum ($g_{a\gamma}$ vs. m_a) ein. Mit ^{3}He wird derzeit der Massenbereich für Axionen weiter ausgedehnt. In diesem Vortrag werden die Ergebnisse der ^{4}He-Phase vorgestellt und vorläufige Resultate der ^{3}He-Phase präsentiert.

HK 8.3 Mo 15:00 H-ZO 70

Simulations of the entrance and exit regions of the KATRIN main spectrometer — Ferenc Glück[2], •Karen Hugenberg[1], Kathrin Valerius[1], Christian Weinheimer[1], and Michael Zacher[1] for the KATRIN-Collaboration — [1]IKP, WWU Münster — [2]IEKP, Universität Karlsruhe

The KArlsruhe TRItium Neutrino experiment aims to determine the electron neutrino mass m_{ν_e} with a sensitivity of 0.2 eV (90 % C.L.) by measuring the shape of the endpoint of the tritium β-spectrum. For this measurement a high resolution spectrometer on the basis of magnetic adiabatic collimation in combination with an electrostatic filter is under construction. It has a diameter of 10 m and a length of 24 m. To reduce background arising in the surface material due to cosmic muons and intrinsic radioactivity, a wire electrode with sub-mm wire diameters will be installed to screen the sensitive spectrometer volume from background electrons. The impact of this wire electrode on the performance of the spectrometer has been studied using a dedicated computer code based on the boundary element method.

This contribution focuses on design simulations for the critical entrance and exit regions of the spectrometer. Different background effects such as particle storage in Penning traps and high electric field strength are discussed. Their avoidance while preserving the intrinsic properties of the spectrometer is essential to reach the desired sensitivity of the experiment. The design has been finalized and the construction of the electrode system is in progress.

This work is financed by the BMBF under code 05A08PM1.

HK 8.4 Mo 15:15 H-ZO 70

Assembly and production of the wire electrode for the KATRIN-Experiment — Sebastian Benning, Volker Hannen, •Björn Hillen, Hans-Werner Ortjohann, Matthias Prall, Christian Weinheimer, and Michael Zacher for the KATRIN-Collaboration — Institut für Kernphysik, Universität Münster

The KArlsuhe TRItium Neutrinomass-Experiment allows the determi-