of ion-photon coincidence measurements.

First experiments with highly charged argon and sulfur ions were performed at energies between 100 and 600 eV/amu, an energy range relevant for modeling the slow components of the solar wind. These measurements have shown the importance of the formation of long lived metastable states. The X-ray emission caused by their decay could be separated and measured independently. The aforementioned contradictions in existing data could potentially be resolved through the reinterpretation of datasets, in light of these new findings.

[1] P. Beiersdorfer *et al.*, *Science* **300**, 1558 (2003)
[2] F. I. Allen *et al.*, *Physical Review* **A78**, 032705 (2008)

A 8.34 Tu 16:30 Lichthof

Interaction of swift heavy- ion beams with insulating targets — G Lanzanó[1], E De Filippo[1], I Lombardo[1], E La Guidara[1], F Amorini[1], N Rizzo[1], G Politi[1], E Geraci[1], P Russotto[1], G Cardella[1], C Volant[2], H Rothard[3], and •S Hagmann[4,5] — [1]INFN+LNS, Catania, Italy — [2]CEA, Saclay, France — [3]CIMAP-CIRIL-GANIL,Caen, France — [4]GSI-Darmstadt, Germany — [5]Inst.f Kernphysik, Univ Frankfurt, Germany

The interaction of ion beams with solids leads to ejection of electrons. For insulating targets, a charging-up of the surface occurs. At present,such phenomena are under inves-tigation in connection with guiding phenomena in nano-cap-illaries with the possible application of nano focused beams. Here, we report the results of a series of dedicated experiments with swift ion beams (C at 23 and 40 AMeV, but also heavier beams such as Ag at 40 A MeV and Xe at 23 and 30 AMeV) and insulating foil targets (Mylar,polypropylene). Also, sandwich-targets (insulators covered with a thin gold layer on one or both surfaces)were used. Fast electron spectra were measured by the time-of-flight method with the ARGOS multidetector at the superconducting cyclotron of LNS Catania. The slowing down of convoy- and binary encounter electrons allows to observe the dynamics of charge build-up leading to potentials of the order of 10 kV [1]. Surprisingly, also X-rays emitted from the projectile are affected by the charged surface, and puzzling results are observed with the double sandwich target. [1] G. Lanzanò, E. De Filippo, S. Hagmann, H. Rothard, C. Volant Rad. Eff. and Defects in Solids 162 (2007) 303-318

A 8.35 Tu 16:30 Lichthof

Fully differential measurements for electron capture in collisions of slow He^{q+} and Ne^{q+} with He and Ne. — •Aditya H. Kelkar, Xincheng Wang, Daniel Fischer, Robert Moshammer, and Joachim Ullrich — Max-Planck-Institut für Kernphysik, Heidelberg, Germany

We report on kinematically complete studies of electron capture from He (and Ne) in collisions with slow He^{q+} (and Ne^{q+}) projectiles using a 'Reaction Microscope'. We succeeded in collecting fully differential data sets for several reaction channels like single and double electron capture, resonant capture and capture accompanied with subsequent auto-ionization. The results are compared with theoretical model calculations. In order to achieve an efficient detection of emitted recoil-ions and electrons we implemented large area position sensitive MCP detectors with central holes for the passage of the projectile beam. This enabled us to measure the recoiling target ion in coincidence with Auger-electrons emitted from the highly excited projectile ion after capture. The experimental setup and first results of ongoing measurements will be presented.

A 8.36 Tu 16:30 Lichthof

First results from the In-Ring Reaction Microscope at the TSR of MPIK — •Katharina Schneider[1,2], Daniel Fischer[1], Michael Schulz[3], Marcelo Ciappina[4], Manfred Grieser[1], Siegbert Hagman[5], Aditya Kelkar[1,2], Tom Kirchner[6], Kai-Uwe Kühnel[1], Xincheng Wang[1], Robert Moshammer[1], and Joachim Ullrich[1] — [1]MPI für Kernphysik, Heidelberg, Germany — [2]EMMI at GSI, Darmstadt, Germany — [3]Missouri University of Science and Technology, Rolla, USA — [4]Institute of High Performance Computing, Singapore — [5]GSI, Darmstadt, Germany — [6]York University, Toronto, Canada

A Reaction Microscope, which enables fully momentum resolved measurements of ionization and charge transfer processes in ion-atom collisions, is implemented in the ion storage ring TSR at the MPIK. Due to the low beam emittance and high intensity achievable in the TSR, the collision dynamics can be studied with high statistics and very good resolution, even on the level of fully differential cross sections. In first measurements, double ionization of helium was studied over a wide range of perturbation parameters η (projectile charge to velocity ratio) and analyzed by means of so-called four-particle Dalitz plots. It is shown that for large η, as expected, the data can best be described by a process not involving the electron-electron correlation. In an upcoming beamtime we aim at kinematically complete measurements for radiative electron capture (REC) in ion-atom collisions, the dominant process for electron transfer at high collision velocities.

A 8.37 Tu 16:30 Lichthof

Characterization of the liquid droplet target beam at the ESR — •Nikolaos Petridis[1], Thomas Stoehlker[2], and Robert E. Grisenti[1] — [1]Institut fuer Kernphysik, JWG-Universität Frankfurt, Germany — [2]GSI, Darmstadt, Germany

At storage rings, atomic processes with small cross-sections (e.g. excitation) can only be studied efficiently when high-density targets are available, in spite of the fact that the ions collide several million times per second with the target. Even state-of-the-art internal targets, which are usually realized by expanding a gas through a nozzle into vacuum, provide target gas densities that are generally still too low. For many nuclear and atomic physics experiments, such as those planned at future facilities like FAIR, this is still a problem. Recently, we have successfully employed a novel cryogenically cooled liquid droplet beam source, and demonstrated that target densities of at least one order of magnitude higher, as compared to previous internal targets, are now experimentally feasible. In order to fully characterize the liquid target beam, we have carried out extensive investigations on ion beam heating and losses during the interaction of the droplets with relativistic hydrogen- and lithium-like uranium ions. Here, we will present the experimental data that are presently being analyzed, and discuss the possible use of droplets for the investigation of fully unexplored collision phenomena. For, the interaction of relativistic highly-charged heavy ions with droplets can, in some respect, be compared to that of intense ultra-short laser-cluster interactions.

A 8.38 Tu 16:30 Lichthof

X-ray spectroscopy of collisions between highly charged Ru ions and H_2 clusters — T. Aumann[1], S. Bishop[3], K. Blaum[9], K. Boretzky[1], F. Bosch[1], H. Bräuning[1], C. Brandau[1,3], T. Davinson[4], I. Dillmann[3], O. Ershova[1,5], H. Geissel[1], G. Gyürky[6], M. Heil[1], F. Käppeler[7], A. Kelic-Heil[1], C. Kozhuharov[1], C. Langer[1,5], T. Le Bleis[1,5,10], Y.A. Litvinov[1,9], G. Lotay[3], J. Marganiec[1], N. Petridis[5], R. Plag[1,5], U. Popp[1], R. Reifarth[1,5], B. Riese[1], C. Rigollet[8], C. Scheidenberger[1], H. Simon[1], Th. Stöhlker[1,11], T. Szücs[6], G. Weber[1,11], H. Weick[1], D.F.A. Winters[1,11], •N. Winters[1,11], P.J. Woods[4], and Q. Zhong[1,2] — [1]GSI Helmholtzzentrum für Schwerionenforschung GmbH, 64291 Darmstadt, Germany — [2]China Institute of Atomic Energy (CIAE), 102413 Beijing, China — [3]Technische Universität München, 85748 Garching, Germany — [4]University of Edinburgh, EH8 9YL Edinburgh, United Kingdom — [5]Goethe-Universität, 60438 Frankfurt a.M, Germany — [6]Institute of Nuclear Research of the Hungarian Academy of Sciences, H-4001 Debrecen, Hungary — [7]Forschungszentrum Karlsruhe, Institut für Kernphysik, 76131 Karlsruhe, Germany — [8]Kernfysisch Versneller Instituut, 9747 AA Groningen, The Netherlands — [9]Max-Planck-Institut für Kernphysik, 69117 Heidelberg, Germany — [10]Institut Pluridisciplinaire Hubert Curien, 67037 Strasbourg, France — [11]Ruprecht-Karls-Universität, 69120 Heidelberg, Germany

We performed x-ray spectroscopy of collisions between Ru^{44+} and H_2 clusters at low energies (≈10 MeV/u) at the Experimental Storage Ring in Darmstadt. This study was performed together with the main experiment, which looked at proton capture (from H_2 by the ion) during the collision (*p*-process). Our goal was to identify the influence of the target density (cluster size) on the collisions via the recorded x-ray spectra. The clusters were generated by a novel cryogenic cluster source, which can create clusters with area-densities as high as 10^{13} $1/cm^2$. We will present the results of our analysis and discuss a follow-up experiment.

A 8.39 Tu 16:30 Lichthof

The Kapitza-Dirac effect in strong laser fields — •Sven Ahrens, Heiko Bauke, Carsten Müller, and Christoph. H. Keitel — Max-Planck-Institut für Kernphysik, Saupfercheckweg 1, 69117 Heidelberg

The diffraction of electrons by a standing light wave is referred to as the Kapitza-Dirac effect, which has been observed in recent experiments [1, 2] at moderate laser intensities. Current high-power lasers