VA 2: Vacuum pumps and gauges

Time: Monday 12:00–12:40 Location: H 0106

VA 2.1 Mon 12:00 H 0106

Investigations of turbo-molecular pumps in magnetic fields for the KATRIN experiment — •Aleksandra Gotsova and Norbert Kernert — Tritiumlabor, Forschungszentrum Karlsruhe, Postfach 3640, 76021 Karlsruhe (KATRIN Collaboration)

The **KA**rlsruhe **TRI**tium **N**eutrino experiment (KATRIN) aims to measure the electron neutrino mass from the β-decay of tritium with an unprecedented sensitivity of 0.2 eV/c^2. The decay electrons will be guided magnetically from the gaseous tritium source through a differential pumping section (DPS) to the high resolution spectrometer. The DPS consists of a beamline with super-conducting magnets and 16 turbo-molecular pumps (Leybold WMAG 2800), which have to prevent tritium gas from entering the UHV spectrometer section.

Systematic studies have been conducted, investigating the rotor temperature and stability of operation of the turbo-molecular pumps (TMP) at full speed as a function of magnetic field strength and direction of the field. The temperature of the moving rotor was measured in vacuum with an infra-red camera. In addition the stability of the pump controller in magnetic fields has been tested. This talk reports on the results of these measurements, giving limits for the save operation of TMPs in magnetic fields.

In part supported by BMBF project 05CK5VKA/5.

VA 2.2 Mon 12:20 H 0106

Partial Pressure Measurement — •Andreas Schopphoff — Pfeiffer Vacuum GmbH, Berliner Str. 43, 35614 Asslar

Partial pressure gauges are essential tools to generate a better knowledge of the state of vacuum. Typical applications are leak detection and residual gas analysis. One of the most often used partial pressure gauge is the quadrupole mass spectrometer. Because of its small size and the high performance it is used in multiple applications. The general operation of a quadrupole mass spectrometer will be discussed in this presentation.

VA 3: UHV systems at FAIR and KATRIN

Time: Monday 14:00–15:00 Location: H 0106

Invited Talk VA 3.1 Mon 14:00 H 0106

The Ultra High Vacuum system of FAIR (Facility for Antiproton and Ion Research) — •Hartmut Reich-Sprenger[1], Maria Cristina Bellachioma[1], Andreas Kraemer[1], Holger Kollmus[1], Markus Bender[1], and Stefan Wilfert[1,2] — [1]Gesellschaft für Schwerionenfiorschung mbH GSI, Darmstadt, Germany — [2]Otto-von-Guericke-Universität, Magdeburg, Germany

The accelerator complex of FAIR is planned to deliver heavy ion beams of increased energy and highest intensity. Whereas the energy is planned to be increased roughly by a factor of 10, the ion beam intensities are planned to be enlarged by three orders of magnitude. An UHV-accelerator system with a base pressure in the low 10E-12mbar regime is required, even under the influence of ion beam loss induced desorption processes.

An intensive program was started to upgrade the Ultra High Vacuum (UHV) system of the existing synchrotron SIS18 (bakeable) and to design and lay out the UHV systems of the future synchrotron SIS100 and SIS300 (mainly cryogenic). The strategy of this program includes basic research on the physics of the ion induced desorption effects as well as technical developments, design and prototyping on bakeable UHV components (vacuum chambers, diagnostics, bakeout-control, pumping speed), collimator for controlled ion beam loss, NEG coating and cryogenic vacuum components.

The key issues of FAIR relevant UHV R&D and system design will be presented

VA 3.2 Mon 14:40 H 0106

Outgassing measurements after 350°C bake-out of the KATRIN sectrometer — •Joachim Wolf — Universität Karlsruhe, IEKP, Postfach 3640, 76021 Karlsruhe (KATRIN Collaboration)

The **KA**rlsruhe **TRI**tium **N**eutrino experiment (KATRIN) aims to measure the electron neutrino mass from the β-decay of tritium with an unprecedented sensitivity of 0.2 eV/c^2. The kinetic energy of the decay electrons will be measured in an electrostatic spectrometer. Background considerations require a very good vacuum of 10^{-11} mbar or better in the large spectrometer vessel (volume 1240 m^3, surface: 690 m^2). A combination of NEG pumps and turbo-molecular pumps will provide the necessary pumping speed. In addition a very clean surface and low outgassing rates are mandatory. This talk reports on the commissioning and final outgassing measurements before and after bake-out at 350°C.

In part supported by BMBF projects 05CK5VKA/5, 05CK5REA/0, 05CK5PMA/0 and 05CK5UMA/3.

VA 4: NEPOMUC positron source and experiments

Time: Monday 15:00–16:40 Location: H 0106

Invited Talk VA 4.1 Mon 15:00 H 0106

Surface and Bulk Investigations at the High Intensity Positron Beam Facility NEPOMUC — •Christoph Hugenschmidt[1,2], Günther Dollinger[3], Werner Egger[3], Gottfried Kögel[3], Benjamin Löwe[1], Jakob Mayer[1], Philip Pikart[1,2], Christian Piochacz[1,2], Klaus Schreckenbach[1,2], Peter Sperr[3], and Martin Stadlbauer[1,2] — [1]TU Munich, Department of Physics E21, James-Franck-Strasse, 85478 Garching — [2]TU Munich, ZWE FRM II, Lichtenbergstrasse 1, 85748 Garching — [3]UniBW Munich, LRT2, Werner-Heisenberg-Weg 39, 85577 Neubiberg

NEPOMUC – the NEutron induced POsitron source MUniCh – delivers a low-energy positron beam (E = 15 - 1000 eV) of high intensity in the range between $4 \cdot 10^7$ and $5 \cdot 10^8$ moderated positrons per second. At present four experimental facilities are in operation at NEPOMUC: A coincident Doppler-broadening spectrometer (CDBS), a positron annihilation induced Auger-electron spectrometer (PAES) and an apparatus for the production of the negatively charged positronium ion Ps^-. Recently, the pulsed low-energy positron system (PLEPS) has been connected to the NEPOMUC beam line and first positron lifetime spectra were recorded within short measurement times. A positron remoderation unit, which is operated with a tungsten single crystal in back reflection geometry has been implemented in order to improve the beam brilliance. An overview of the status of the neutron induced positron source NEPOMUC at the research reactor FRM II and recent developments at the running spectrometers is given.

VA 4.2 Mon 15:40 H 0106

Gas moderation of positrons — •Benjamin Löwe[1,2], Klaus Schreckenbach[1,2], and Christoph Hugenschmidt[1,2] — [1]TU München, FRM II, Lichtenbergstr. 1, 85747 Garching — [2]TU München, Physik Department E21, James Franck Str., 85748 Garching

A variety of low energy positron experiments need an improved brilliance of the beam by means of a remoderator. Conventionally, a tungsten foil or single crystal is used as a remoderator in transmission or reflection geometry. In this project a novel remoderation unit was developed and tested at the positron beam facility NEPOMUC at the