

VA 3: Vacuum Generation & Measurement

Time: Monday 14:00–15:45

Location: H25

Invited Talk

VA 3.1 Mon 14:00 H25

Development of an Absolute Valve for ITERs Neutral Beam Injection — ●MARTIN GREUTER and VERENA SAISSRAINER — VAT Vakuumentile AG, Seelistr. 1, 9469 Haag, Switzerland

VAT vacuum valves was awarded a contract by ITER to develop a DN1600 All Metal Pendulum Valve that provides isolation between the ITER vacuum vessel and the beam vessel for its Neutral Beam Injection. For the thermomechanical and seismic analysis, a collaboration contract between VAT and the Culham Centre for Fusion Energy (CCFE) was signed. The presentation will give an insight into how the transfer of knowledge between Research Institutes and Industry can be leveraged to develop the largest All Metal valve ever, complying with design regulations such as RCC-MR, dimensional restrictions while maintaining the common functionality of a field proven VAT All Metal Valve.

VA 3.2 Mon 14:45 H25

Design development of a Linear Diffusion Pump — ●HOLGER STROBEL, CHRISTIAN DAY, THOMAS GIEGERICH, and RALF MÜLLER — Institut für Technische Physik (ITEP), Karlsruher Institut für Technologie (KIT), Campus Nord, Eggenstein-Leopoldshafen, D-76344

In fusion power plants, the hydrogen isotopes deuterium and tritium are merged together to helium under the release of huge amounts of energy. The fusion reaction takes place in a plasma contained in vacuum. Fusion reactors require very large vacuum chamber and a powerful vacuum pumping system that is able to pump the reactor down and to keep the vacuum against a certain fuelling gas flow. For the primary pumps, linear mercury diffusion pumps (LDPs) have been proposed by KIT and are now under development.

The LDPs need to be supplied with mercury vapour (433 K), cool water (273 K) and a heat transfer fluid to supply the two internal baffles

(180 K, 220 K) that trap the mercury inside the pump. The different temperature and pressure levels lead to high mechanical stresses in the pump case and thus require a full mechanical simulation of the pump using finite element methods. Furthermore, a bake-out of the pump must be possible and, for safety reasons, an internal explosion must be tolerated.

This talk gives an overview on the development of the LDP starting from a conceptual design. During this work, different load cases have been simulated using ANSYS and a more detailed design has been elaborated in an iterative process.

VA 3.3 Mon 15:15 H25

Turbo pump and measurement technology optimized for UHV-applications — ●ANDREAS KRAFT — Pfeiffer Vacuum, Berliner Strasse 43, 35614 Asslar

Keeping abreast of the latest news with your smartphone, seeing better thanks to high quality eyeglasses, and discovering the world independently while on the go in your car - these and many other conveniences of everyday living would be impossible without vacuum. Pfeiffer Vacuum - a name that stands for innovative solutions, high technology and dependable products, along with first-class service. For more than 125 years we have been setting standards in vacuum technology with these attributes. One very special milestone was the invention of the turbopump at our Company more than 50 years ago. Our extensive line of solutions, products and services ranges from vacuum pumps, measurement and analysis equipment right through to complex vacuum systems. Thanks to close collaboration with our customers from a wide variety of industries and our continuous focus on their needs, we constantly optimize and expand our product line. Among others the talk will present two of our newest developments in the field of ultra-high vacuum generation and measurement: A new 300 l/s turbopump with highest compression for light gases and improved ionization gauges.