P 16: Invited talks IV

Time: Thursday 11:00–12:30 Location: P-H11

Invited Talk P 16.1 Thu 11:00 P-H11

Effect of the green energy revolution on circuit breakers and switches in electrical power distribution systems — •Erik D. Taylor — Siemens AG, Berlin, Germany

Green energy and the general energy revolution are widely discussed as key components in reducing the magnitude of climate change. Most discussions focus on converting to electrical power produced from green sources. However, an important piece of this puzzle is the electrical distribution and transmission systems required to enable this transformation. Green energy and the increased use of electrical power creates new demands on the circuit breakers and switches in electrical distribution systems. The first part of this talk will describe why you need circuit breakers and switches on electrical distribution systems, and what they do. The second part will look at what requirements and applications have changed for these circuit breakers. This includes new requirements from increased usage and the replacement of SF6-based circuit breakers, new conditions created by green energy sources, and the switching of DC currents. The final part will look at how these problems are being solved using vacuum interrupters and vacuum switchgear and look at the plasma physics problems involved with their use.

Invited Talk P 16.2 Thu 11:30 P-H11

Plasma-beta effects on the island divertor of Wendelstein 7-X — •Alexander Knieps[1], Yasuhiro Suzuki[2], Joachim Geiger[3], Andreas Dinklage[3], Song Zhou[1,4], Henning Thomsen[3], Marcin Jakubowski[3], Ralf König[3], Michael Endler[3], Yu Gao[3], and Yunfeng Liang[1,4] — [1]Forschungzentrum Jülich, Jülich — [2]Graduate School of Advanced Science and Engineering, Hiroshima University, Higashi-Hiroshima, Japa — [3]Max-Planck-Institut für Plasmaphysik, Greifswald — [4]Huazhong University of Science and Technology, Wuhan, China

The Wendelstein 7-X Stellarator relies on an island divertor to control its heat- and particle-exhaust. In this divertor concept, the scrape-off layer is formed by a magnetic island chain between the divertor plates and the main plasma.

It is important to conserve the divertor topology in the up- coming steady-state experimental campaign. However, the magneto-hydrodynamic plasma response driven in finite-beta plasmas can substantially effect the magnetic topology in the plasma edge. Depending on the configuration, the plasma response have distinctly different effects.

This presentation will showcase finite-beta MHD equilibrium simulations for finite-beta plasmas in different magnetic configurations of W7-X, calculated with the 3D MHD equilibrium code HINT. Based on these simulations, we then extrapolate the heat-loads on plasma-facing components using an anisotropic diffusion model.

Invited Talk P 16.3 Thu 12:00 P-H11

Surface modification of inorganic materials by atmospheric-pressure plasmas — •Claus-Peter Klages and Vitaly Raev — Institute for Surface Technology, Technische Universität Braunschweig, Braunschweig, Germany

As far as applications in surface technology are concerned, atmospheric-pressure plasmas such as dielectric barrier discharges (DBDs) are frequently associated with polymeric surfaces and plasma polymer deposition. In the present contribution it will be demonstrated, however, that DBDs can also be applied to achieve practically useful modifications of inorganic surfaces utilizing processes which are also of scientific interest.

Examples are the reduction of metal compounds like oxides or sulfides as well as the oxidation of metals, hydrolysis of siloxane bonds on silica surfaces, and the pretreatment of silicon surfaces for low-temperature direct wafer bonding. The focus of the lecture is on recent studies on a ”dry” silanization process for the preparation of quartz fibers for applications as optical sensors and on low-temperature oxidation of aluminum using DBDs in argon-water and argon-oxygen mixtures, respectively.