VA 1: Vacuum Science and Technology (Oral Session)

Time: Tuesday 11:00–11:50 Location: HL 001

VA 1.1 Tue 11:00 HL 001

Construction of a triple-cooling rod for high purity germanium detectors for Coincidence Doppler Broadening Spectroscopy — Christoph Hugenschmidt, Danny Russell, Leon Chryssos, and •Patrick Oberländer — TUM & FRM2, Munich, Germany

The Coincidence Doppler Broadening Spectrometer (CDBS) located at the positron beam facility NEPOMUC allows elemental sensitive defect spectroscopy with highest spatial resolution. At present, the annihilation radiation is recorded by high purity germanium detectors cooled by conventional dewars filled with liquid nitrogen. In order to significantly reduce the measurement time we want to upgrade the spectrometer by increasing the field of view of the detectors. The setup with multiple detectors in close proximity within constrained space will be realized by a new low-cost cryo setup. For this purpose, we design a new cooling device that allows us to cool a cluster of three detectors at once. In this contribution the engineering as well as simulations and measurements for both the bendable cryo-joint and the triple-connector will be presented.

VA 1.2 Tue 11:25 HL 001

An improved numerical simulation methodology for nano particle injection through aerodynamic lens systems — •Surya Kiran Peravali Peravali[1,4], Amit K Samanta[1,3], Muhammed Amin[1], Jochen Küpper[1,2,3], Philipp Neumann[4], and Michael Breuer[4] — [1]Center for Free-Electron Laser Science, Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany — [2]Department of Physics, Universität Hamburg, Germany — [3]Center for Ultrafast Imaging, Universität Hamburg, Germany — [4]Fakultät für Maschinenbau und Bauingenieurwesen, Helmut-Schmidt-Universität,Germany

Aerosol injectors applied in single-particle diffractive imaging (SPI) experiments have demonstrated their potential in efficiently delivering nano-particles with high density [1]. Continuous optimization of injector design is crucial for achieving high density particle streams, minimizing background gas, enhancing X-ray interactions, and generating high-quality diffraction patterns. In this contribution, we present a simulation framework designed for the fast and effective exploration of the experimental parameter space to enhance the optimization process. The framework includes simulating carrier gas and particle trajectories within injectors and their expansion into the experimental vacuum chamber by utilizing a hybrid continuum-molecular simulation method (CFD/DSMC) to accurately capture the multiscale nature of the flow. We elaborate the simulation setup, present initial benchmarking results from our coupled approach, and validate the methodology against experimental data.

[1] N.Roth et al., J. Aerosol Sci. 124, 17 (2018)