AKBP 12: Electron Accelerator

Time: Wednesday 15:00–16:00 Location: MOL 213

AKBP 12.1 Wed 15:00 MOL 213

Recent Developments at the S-DALINAC* — •M. Arnold, J. Birkhan, A. Brauch, C. Caliari, M. Dutine, J. Enders, M. Fischer, R. Grewe, J. Hanten, L. Jürgensen, M. Meier, J. Pforr, N. Pietralla, F. Schliessmann, M. Steinhorst, L. Stobbe, and S. Weih — IKP, TU Darmstadt

The superconducting Darmstadt linear accelerator, S-DALINAC, was set into operation at TU Darmstadt in 1991 as a twice-recirculating linac for electrons. In 2015/2016 a third recirculation beam line was added to achieve the maximum design energy of 130 MeV, higher operational stability, and to enable operation in an energy-recovery linac (ERL) mode [1,2]. Since its establishment, the S-DALINAC was mainly developed and operated by students. Also during the past year, various projects have progressed and several measurements with beam have been done. For example, a new system for the measurement of beam emittance by optical transition radiation (OTR) was set into operation. Additional diagnostics have been commissioned or are under construction. Further upgrades of the injector section are in preparation. Several projects are addressing the ERL operation of the S DALINAC. Simulations and dedicated diagnostics for the twice-recirculating ERL mode are under investigation. This contribution will give an overview on the status of those projects.

[1] N. Pietralla, Nuclear Physics News, Vol. 28, No. 2, 4 (2018).
[2] M. Arnold et al., submitted to PRAB (2019).

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AKBP 12.2 Wed 15:15 MOL 213

Beam Pulsing at the S-DALINAC: Superposition of the 3 GHz Beam Structure with a 10 MHz Macrostructure — •Lennart Stobbe, Michaela Arnold, Jonny Birkhan, Uwe Bonnes, Lars Jürgensen, and Norbert Pietralla — Institut für Kernphysik, TU Darmstadt, Germany

The superconducting electron-linear-accelerator S-DALINAC provides a cw-beam with a 3 GHz time structure for electron scattering experiments [1]. This mode is fixed and does not allow to deliver a pulsed beam to the experimental setups. Time of flight measurements are currently not feasible at the so-called QCLAM magnetic spectrometer, which would be needed for particle separation within coincidence experiments as well as for a significant background suppression. Therefore, a new concept for pulsing the electron beam at the S-DALINAC has been developed. It is planned to superimpose the 3 GHz beam structure with a 10 MHz macrostructure. This concept is based on using a plate capacitor setup in order to achieve the superposition. The plate capacitor will deflect the beam across an aperture with a repetition rate of 10 MHz. The current state of the capacitor setup as well as several simulations will be presented.

[1] N. Pietralla, Nuclear Physics News, Vol. 28, No. 2, 4 (2018)

AKBP 12.3 Wed 15:30 MOL 213

Status of the KIT accelerators at KARA and FLUTE — •Bastian Härer[1], Axel Bernhard[1], Edmund Blomley[2], Tobias Boltz[2], Miriam Brosi[2], Andi Chai[2], Erik Bründermann[1], Sara Casalbuoni[1], Kantaphon Damminsek[2], Dima El Khechen[2], Stefan Funkner[2], Julian Gethmann[2], Andreas Grau[1], Erhard Huttel[1], Benjamin Kehrer[2], Anton Malygin[2], Sebastian Maier[2], Matthias Martin[2], Sebastian Marsching[2], Yves-Laurent Mathis[1], Wolfgang Mexner[1], Akira Mochihashi[1], Matthias Nabinger[2], Michael J. Nasse[1], Gudrun Niehues[2], Meghana Patil[2], Alexander Papash[1], Micha Reissig[2], Robert Ruprecht[1], David Saez de Jauregui[1], Carl Sax[2], Jens Schäfer[2], Thiemo Schmelzer[2], Patrick Schreiber[2], Marcel Schuh[1], Nigel J. Smale[1], Johannes L. Steinmann[1], Yimin Tong[2], Pawel Wesolowski[1], Tonia Windbichler[2], Chenran Xu[2], Minjie Yan[1], and Anke-Susanne Müller[1,2] — [1]IBPT, KIT, Karlsruhe, Germany — [2]LAS, KIT, Kalrsruhe, Germany

The Institute for Beam Physics and Technology (IBPT) at the Karlsruhe Institute of Technology (KIT) operates the Karlsruhe Reaseach Accelerator (KARA) and the Ferninfrarot Linac and Test Experiment (FLUTE). This contribution gives an overview of both facilities and the respective accelerator physics research activies.

AKBP 12.4 Wed 15:45 MOL 213

Status of the Conceptual Design of Ultrafast Electron Diffraction at DELTA — •Daniel Krieg[1], Shaukat Khan[1], Klaus Sokolowski-Tinten[2], and Thies Johannes Albert[2] — [1]Center for Synchrotron Radiation, TU Dortmund University, Dortmund, Germany — [2]University Duisburg-Essen, Duisburg, Germany

Ultrafast electron diffraction (UED) is a pump-probe technique that combines sub-angstrom De-Broglie wavelengths of MeV electrons with a femtosecond time resolution. Therefore, an ultrashort pump laser adjustable in photon energy, electron bunches with small emittances, ultrashort length and typically charges well below 1pC, as well as an excellent synchronization system are required. UED systems based on a radiofrequency photocathode gun offer advantages regarding emittance and bunch length compared to electrostatic keV systems. Hence, providing more electrons per bunch is possible. Furthermore, the longer mean free path of MeV electrons allows for thicker samples and thus a broader range of possible materials. In this talk, latest results on the conceptual design of a university-based UED facility with ultrashort and low-emittance MeV electron bunches are presented.

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