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Prospects of Hybrid Plasma- and Radiofrequency-Based Electron Acceleration at DESY JENS OSTERHOFF, FLORIAN GRUENER, University of Hamburg, 22761 Hamburg, Germany, ECKHARD ELSEN, KLAUS FLOETTMANN, BRIAN FOSTER, REINHARD BRINKMANN, BERNHARD SCHMIDT, HOLGER SCHLARB, FRANK STEPHAN, Deutsches Elektronen-Synchrotron DESY, 22607 Hamburg, Germany — The field of particle acceleration in plasma wakes has seen remarkable progress in recent years. Accelerating gradients of more than 10 GV/m can now be readily achieved using either ultra-short intense laser pulses or particle beams as wake drivers. The demonstration of the first GeV electron beams and a general trend towards improved reproducibility, beam quality and control over the involved plasma processes has led to plasma-acceleration techniques beginning to draw considerable interest in the traditional accelerator community. As a consequence, DESY, Germany's leading accelerator center, has established a research program for plasma-based novel acceleration techniques with the goal of exploiting the synergetic combination of conventional and new accelerator technology. Such a concept offers an attractive pathway to study many mechanisms occurring in plasma-based accelerators, for example electron-beam-emittance evolution, extreme bunch compression, the controlled emission of betatron radiation, and staging of accelerating units. In addition, it is assumed that bypassing the difficult-to-master process of particle self-injection, which is utilized in all current laser-plasma acceleration schemes, will greatly enhance the reliability of such machines compared to the state-of-the-art.

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