

# Joint DESY and University of Hamburg Accelerator Physics Seminar

Tuesday, 19.01.2021

(16:00, virtually)

Permanent Magnets for Emerging Accelerator Applications

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## Abstract

Recent developments in the design, manufacture and shimming of Halbach-derived permanent magnets have extended the applications of these magnets in accelerator settings. The CBETA multi-turn ERL project operating at Cornell in 2019-20 used an oval-shaped loop entirely made from permanent magnets to return four different energies of electrons (42, 78, 114, 150MeV) to the linac through the same aperture. This was enabled through use of fairly high gradients 10T/m and very short focussing cell length 45cm. Over 200 such magnets were built and used successfully, incorporating a generalised shimming method to achieve better than  $10^{-3}$  relative error over a 50mm diameter good field region and a novel combined function dipole plus quadrupole magnet geometry. After the success of CBETA, further design work proposes to test new features such as open midplanes for high energy electron machines, to allow synchrotron radiation to escape, and oval apertures that allow higher gradient quadrupoles for elliptical beams. Proposals to extend the technology to smaller geometries and higher gradients, applicable for next-generation light sources, will also be discussed.

W.Hillert (Univ. HH), I.Agapov (MPY) and M.Vogt (MFL).