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PM magnet development status for BESSY2+

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Permanent-Magnet (PM) magnets combine up to zero power consumption with highly stable magnet operation without ripple and cooling vibration effects for more energy-efficient and stable accelerator operation.
As part of the upgrade program BESSYII+, we will install the B2PT dipole triplet as the first PM-based accelerator magnet. It concludes the BESSYII transfer line, transporting the electron beam from the booster to the storage ring and bends the beam into the injection septum of the BESSYII storage ring.
The new B2PT is planned with three PM hybrid dipole units of 300 mm length each to substitute the present power-hungry 1-m long electromagnet. The triplet produces a stable magnetic field that can be trimmed during operation by electro-correctors in the outer magnets. The permanent magnetic field reduces injection noise into the storage ring and shrinks the total power consumption by almost 30 kW.
This paper reviews simulated beam bending optimization of the B2PT PM triplet and its assembly process opening up to PM magnet development also required for the preparation of the future 4th-gen low-emittance source BESSYIII.

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Author: ASPARUHOV, Ilia (Helmholtz-Zentrum Berlin für Materialien und Energie)

Co-authors: BÖHLICK, Daniel (Berliner Elektronenspeichering-Gesellschaft für Synchrotronstrahlung m.b.H.); DIRSAT, Marc (Berliner Elektronenspeichering-Gesellschaft für Synchrotronstrahlung m.b.H.); DÜRR, Volker (Helmholtz-Zentrum Berlin für Materialien und Energie); GOSLAWSKI, Paul (Helmholtz-Zentrum Berlin für Materialien und Energie GmbH); JANKOWIAK, Andreas (Humboldt-Universität zu Berlin); PFLOCKSCH, Fabian (Helmholtz-Zentrum Berlin für Materialien und Energie GmbH); RIES, Markus (Helmholtz-Zentrum Berlin für Materialien und Energie GmbH); VOELKER, Jens (Helmholtz-Zentrum Berlin für Materialien und Energie GmbH)

Presenter: ASPARUHOV, Ilia (Helmholtz-Zentrum Berlin für Materialien und Energie)

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