ASC 2026

View Abstract

CONTROL ID: 4514148

SUBMITTER: Ramesh Gupta

ABSTRACT TITLE: Updated Design of the EIC IR Dipole Magnet B0ApF

AUTHORS (FIRST NAME, LAST NAME): Ramesh Gupta[1], Michael Anerella[1], Jason Becker[1], John escallier[1], Piyush N. Joshi[1], Mithlesh Kumar[1], Andrew J Marone[1], Brett Parker[1], Chris Runyan[1], Vikas Teotia[1], Ye Bai[1], J Scott Berg[1], Kirsten A. Drees[1], Timothy J. Hollis[1], Paolo Ferracin[1]

AUTHOR INSTITUTIONS: 1. Brookhaven National Laboratory, Upton, NY, United States.

ABSTRACT: Interaction Region (IR) of the Electron–Ion Collider (EIC), under construction at Brookhaven National Laboratory (BNL), needs several superconducting magnets. This includes the B0APF dipole, the first magnet on the forward side, just after the large aperture spectrometer dipole B0pF and before a series of quadrupole and dipole magnets. The primary purpose of this dipole is to correct the effects of keeping B0PF at a constant field for all beam energies. B0ApF ensures that the hadron beam stays within the beam pipes of various IR magnets while accounting for the deflections in other magnets, including the deflections from the off-axis beam in quadrupoles. This magnet will be built based on direct wind technology, which requires little magnet specific engineering and tooling and hence significantly reducing the cost when only one such magnet is required. The complete multi-layer B0ApF corrector package will include a set of additional coils to provide (a) skew quadrupole, (b) skew dipole, and (c) possibly a sextupole. As such a full-length prototype of B0ApF has been built with a Small Business Technology Transfer grant to Particle Beam Lasers Inc. (PBL) in partnership with BNL to demonstrate the Optimum Integral Design (OID). The PBL/BNL B0ApF magnet is ready to be tested soon and is the subject of another paper in this conference. OID is particularly attractive for short magnets where the coil length to coil aperture ratio is small as it significantly reduces the loss in field integral due to ends. A recent update in the design parameter has increased the coil length from 600 mm to 745 mm and reduced the B0ApF dipole coil aperture from 114 mm to 112.8 mm, increasing the coil length to coil aperture ratio from ~5.3 to ~6.6. The integral field requirements has also been reduced from 1.98 T.m to 1.56 T.m, which will reduce the number of layers in any multi-layer design. The increase in the coil length to coil aperture ratio will be larger in the corrector coils because

	the coil radii will be smaller. We are in the process of studying various coil patterns, including the serpentine pattern which has been used in several other EIC IR magnets, in addition to the baseline OID pattern. There is also a possibility of further reduction in integral field required from the B0ApF dipole coils. This paper will report the design studies based on the latest parameters.
	ACKNOWLEDGMENT: *This work is supported by Brookhaven Science Associates, LLC under contract No. DE-SC0012704, with the U.S. Department of Energy.
	PRESENTER: Ramesh Gupta
	PRESENTER EMAIL: gupta@bnl.gov
	PRESENTATION PREFERENCE: Poster
	Oral Presentation justification (if oral was selected):
	SUBMISSION CATEGORY: L-40: Accelerator, wiggler, undulator, special magnets
	SUB-CATEGORY: 40d. Accelerator magnets: Correctors
	Appropriate for TES Workshop: Yes
	STUDENT: No
	LETTER OF INVITATION: No
	MODERATOR AND/OR REVIEWER: Yes, both
	CO-AUTHOR AFFIRMATION: By checking this box, I, the submitting author, affirm that all co-authors know of and concur with the submission of this abstract.
	ASEF/ASC EMAIL LIST: I acknowledge that I can opt-out at any time from ASC conference announcements.

SCHOLARONE CONFERENCES

© 2025 Silverchair. All Rights Reserved. | © ScholarOne, Inc., 2026. All Rights Reserved.
ScholarOne and Abstract Central are registered trademarks of ScholarOne, Inc.

Sign up to receive updates | System Requirements | Privacy Statement | Terms of Use | Accessibility

Product version number 4.17.4 (Build 367). Build date Tue Dec 16 06:59:32 EST 2025. Server ip-10-236-26-40