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Status of B1pF-large aperture superconducting magnet for EIC interaction region

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The Electron-Ion Collider (EIC) Interaction Region (IR) requires challenging superconducting magnet designs to accommodate inflexible space constraints while simultaneously demanding large apertures with high fields and high quality. Some of these superconducting magnets are built with direct wind technology, some others will be based on a collared magnet design due to the challenges posed by the high stored energy and large aperture size. B1pF is such a dipole magnet, located on the forward side of the IR, designed as a single layer coil of NbTi Rutherford cable with a 300 mm aperture diameter and a total length of 3 m. To validate the design choices and operational challenges for all collared magnets, a full-length prototype is currently under development at the Superconducting Magnet Division at Brookhaven National Laboratory (BNL). This prototype will be tested at the vertical test facility at BNL at its operating temperature of 4.2 K.
This contribution discusses the electromagnetic design of B1pF and mechanical challenges at various stages of development with a focus on the prototype design and testing. Solutions for instrumentation and magnet protection are also discussed.

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