

Chiral Belle: SuperKEKB e- Polarization Upgrade

Monday Jun 16, 2025, 4:00 PM → 6:15 PM Asia/Tokyo

Meeting room 1st floor (3-go-kan)



Brookhaven[™]
National Laboratory



U.S. DEPARTMENT OF
ENERGY

Spin Rotator R&D status

Vikas Teotia

Superconducting Magnet Division

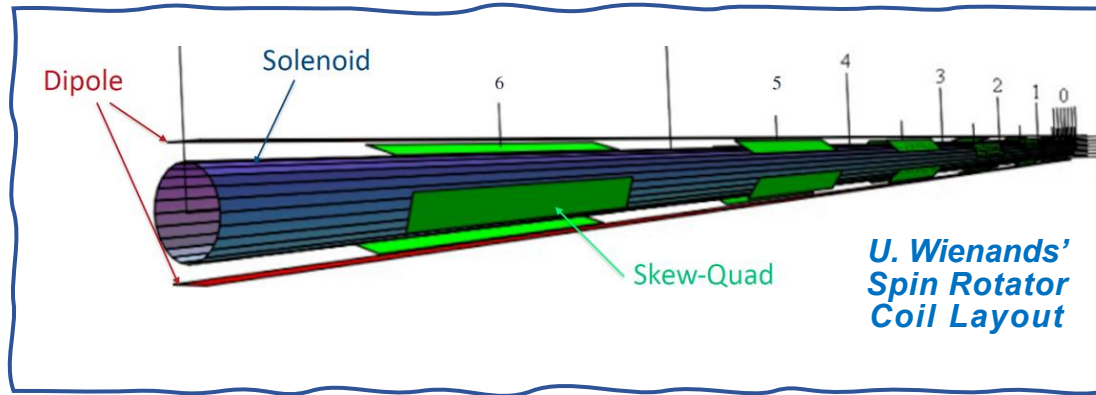


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Outline

1. Recent update of work : eeFACT by Brett Parker et. al.
2. HER Dipole and new Superconducting direct wind dipole magnet
3. Progress on prototype
4. Near future work

The Compact Multifunction Concept for SuperKEKB HER



- Dipole coil matches the HER ring dipole bending,
- Along with solenoid to change the spin direction,
- Skew-quads make optics and coupling corrections.
- **Turning solenoid and skew-quads off restores HER!**



HER Warm Dipoles in Tunnel at KEK.

A novel spin rotator concept for longitudinally polarized beam for Chiral Belle at SuperKEKB

TUB12

Mar 4, 2025, 4:40 PM

30m

304 (EPOCHAL)

Invited Oral Presentation

WG10 : Magnets, IR,...

Magnets, IR, Alignment

Speaker

Brett Parker (Brookhaven National Laboratory)

Brett Parker

Each spin rotator module is a drop-in replacement for an existing HER warm dipole that leaves the overall SuperKEKB ring geometry unchanged.*

*Standard solenoid spin rotator solution requires placing them at “magic angles” w.r.t. the IR, causing the ring geometry to change (also needs additional lattice space) and introduces optics changes and coupling that must be carefully (externally!) compensated.

HER Dipole and new Superconducting direct wind dipole magnet

Transparency of existing beam line with respect to new magnet

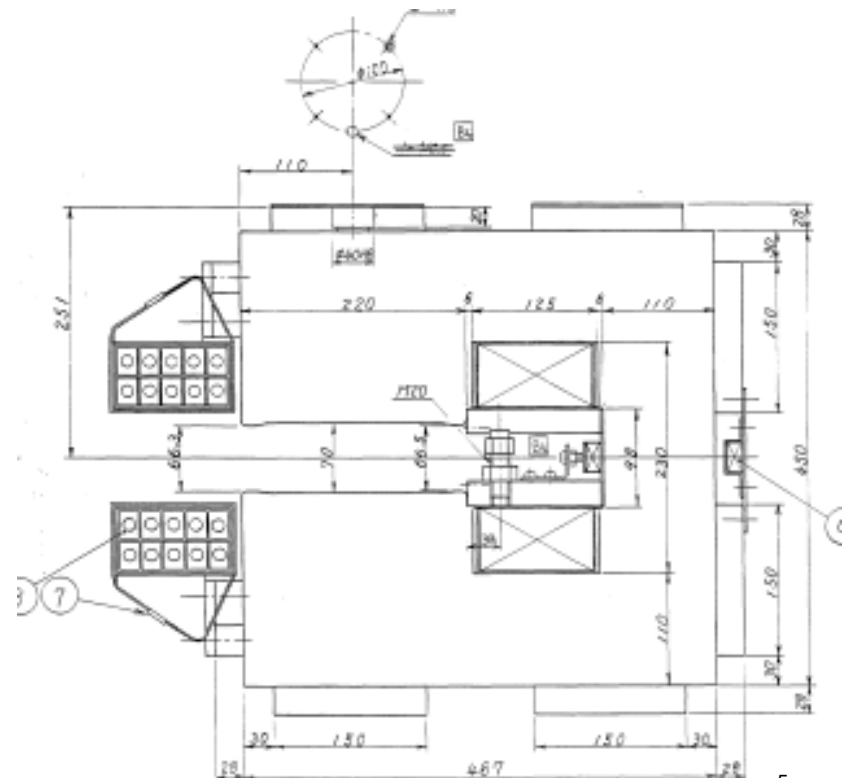
Brookhaven is studying the electromagnetic design of the existing HER dipole to evaluate its key performance indicators and field-map. The new design need to comply/mirror these performance.

Reliability and availability of cryo-cooled systems

The proposed spin-rotator is cryocooled, its reliability and availability need to be studied to ensure it does not impede the performance the normal running of the machine

Synchronous radiation studies

For determining the required ID of the beam aperture of the spin rotator



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Prototype development

Working with University of Victoria to design a meaning full spin-rotator prototype.

Near Future work

1. Study of EM design of existing HER dipole magnet
2. Minimum beam aperture estimates considering synchrotron radiations
3. Design of prototype spin rotator (with UV)
4. Design of Direct Wind Dipole, Skew Quadrupoles and Solenoid Magnets

Thanks for your kind attention!