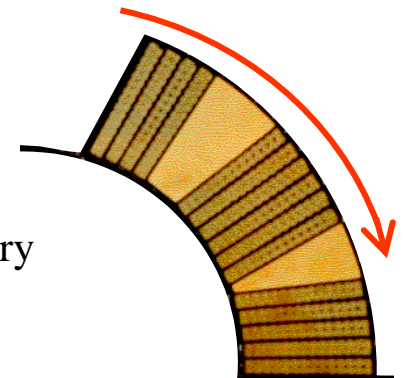


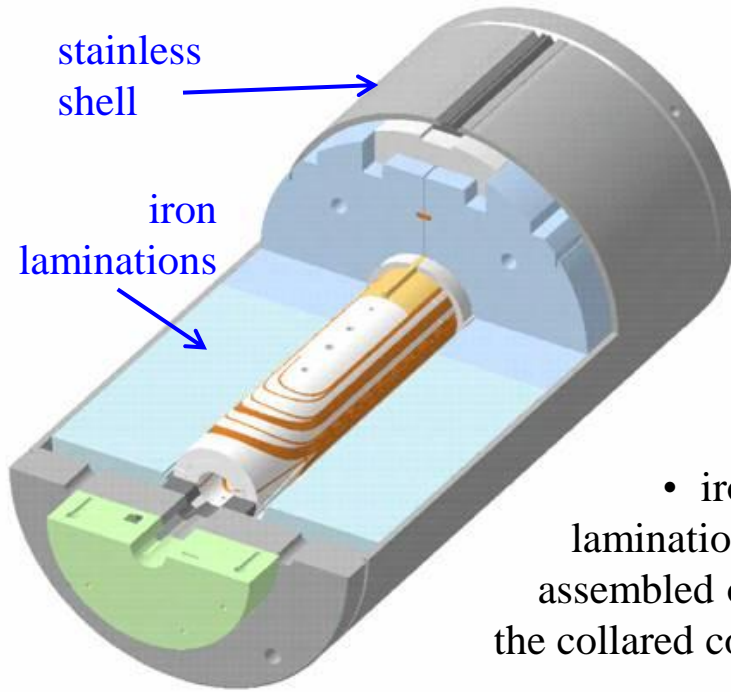
Collars and end plate (LHC dipole)



- sliding at the outer boundary
⇒ friction heating
- use kapton layers



Adding the iron



- iron laminations assembled on the collared coil

- pushed into place using the collaring press
- **BUT** pure iron becomes brittle at low temperature
- tensile forces are therefore taken by a stainless steel shell which is welded around the iron, while still in the press
- stainless shell also serves as the helium vessel

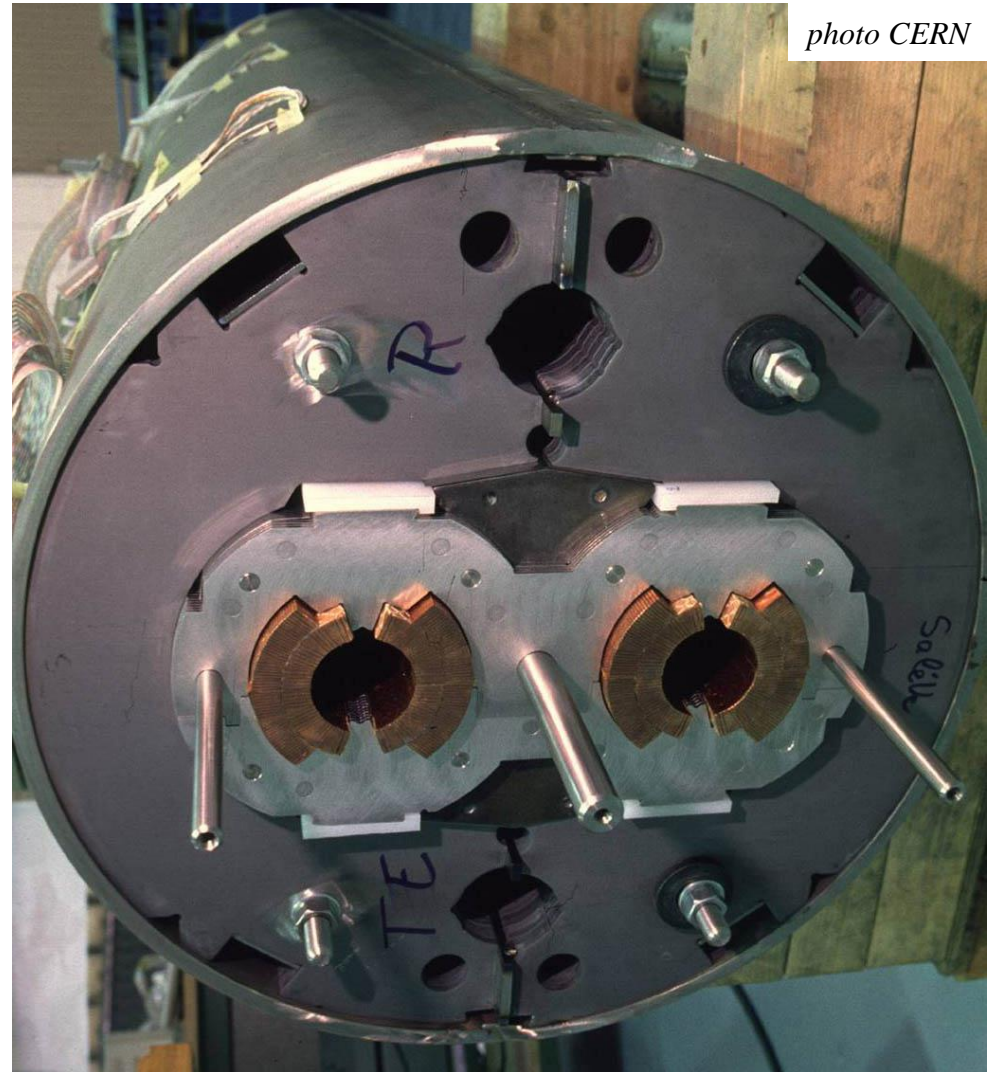
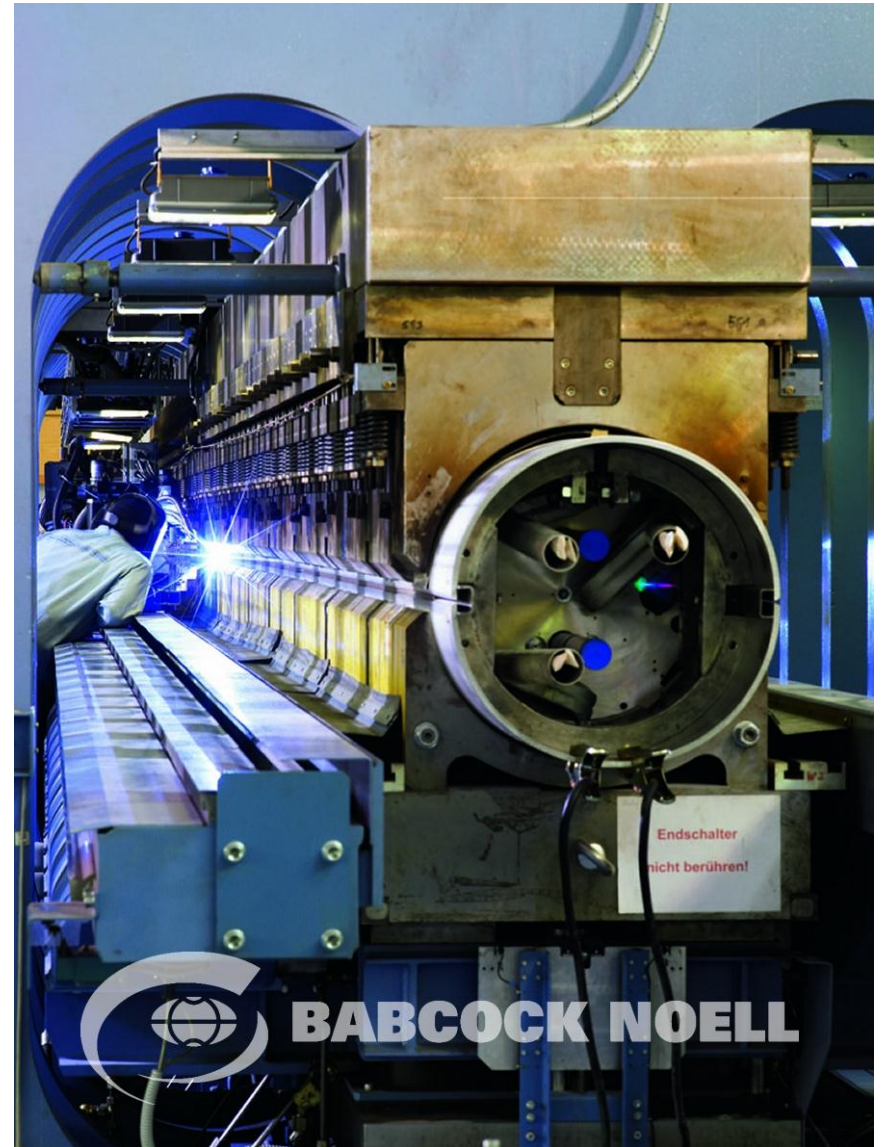
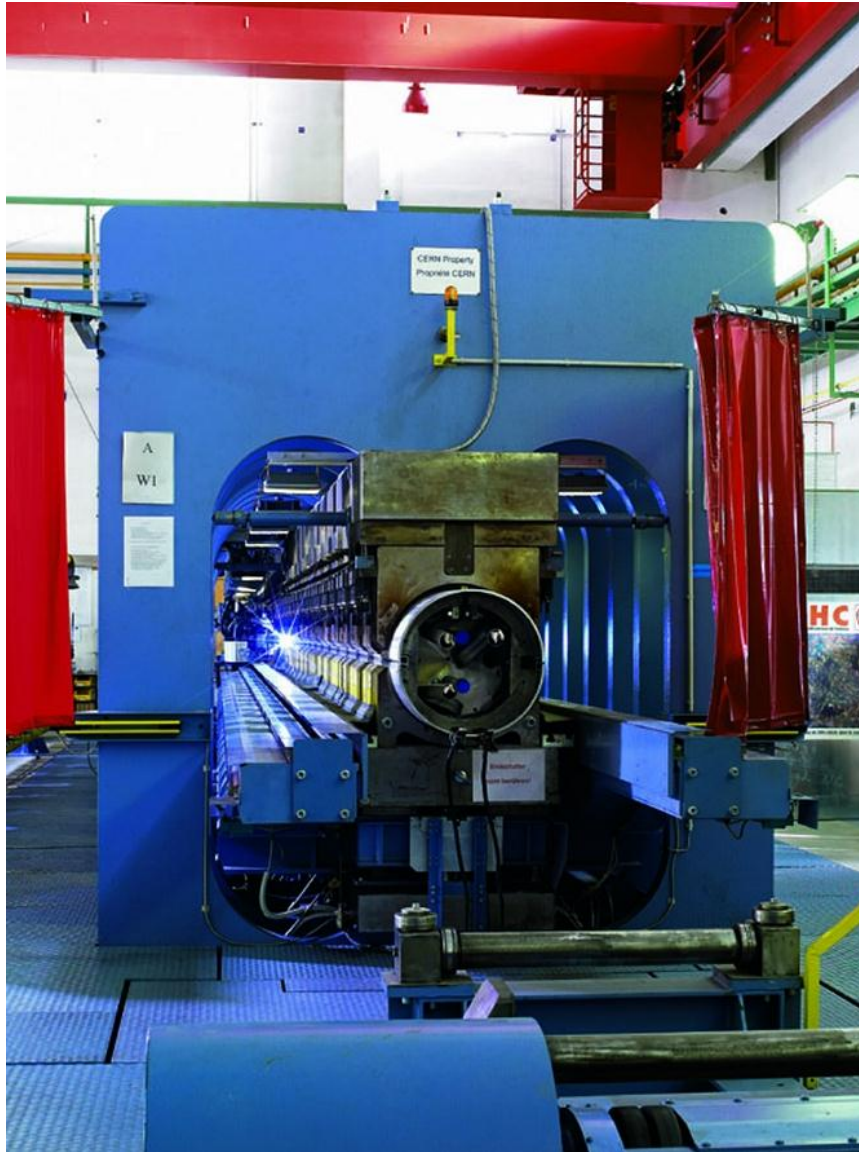


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Compressing and welding the outer shell



Dipole inside its stainless shell

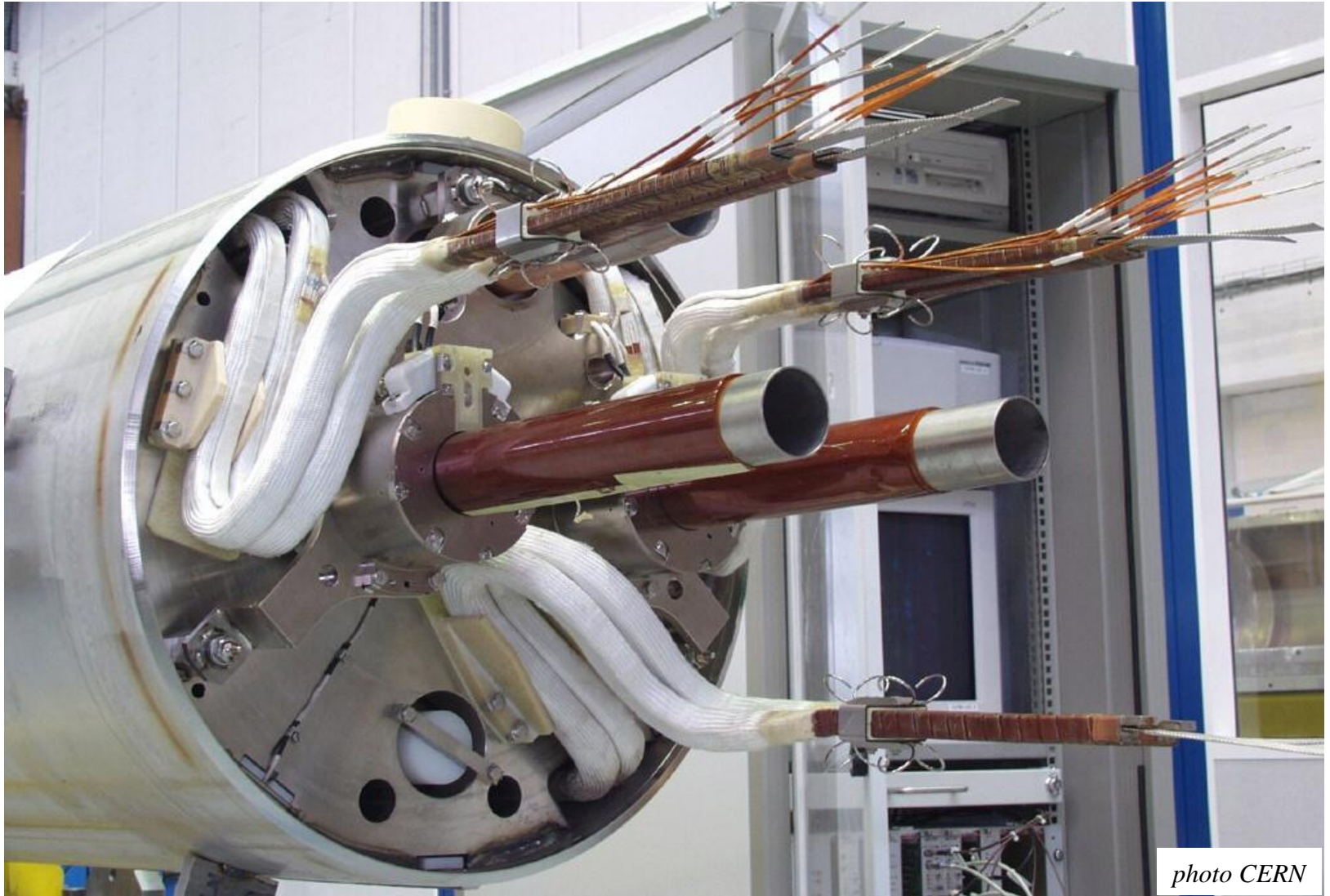


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Cryogenic supports

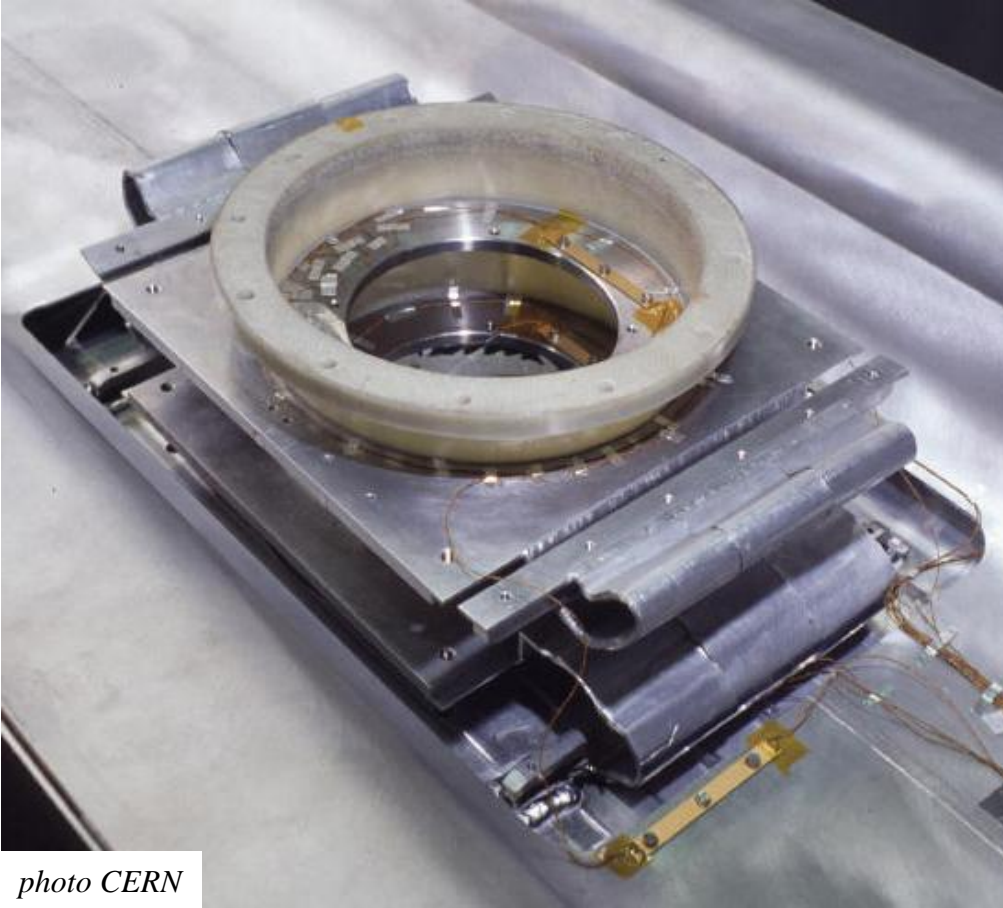
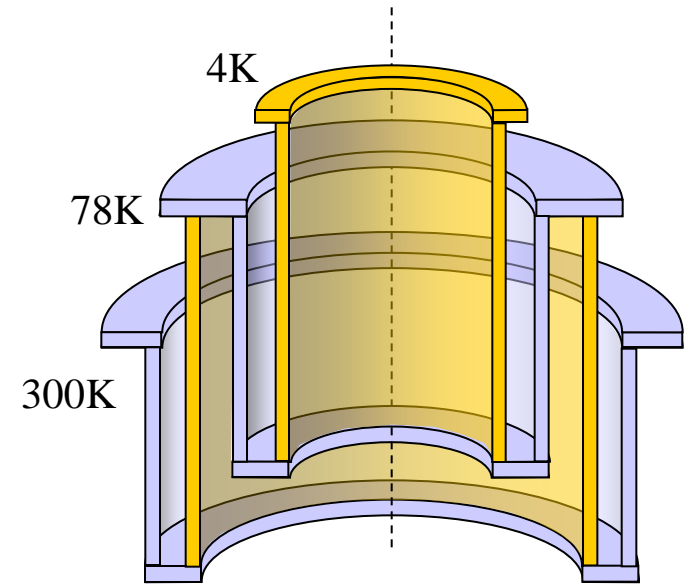


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'feet' used to support cold mass inside cryostat (LHC dipole)



the Heim column

- long path length in short distance
- mechanical stiffness of tubes
- by choosing different material contractions can achieve zero thermal movement

Complete magnet in cryostat



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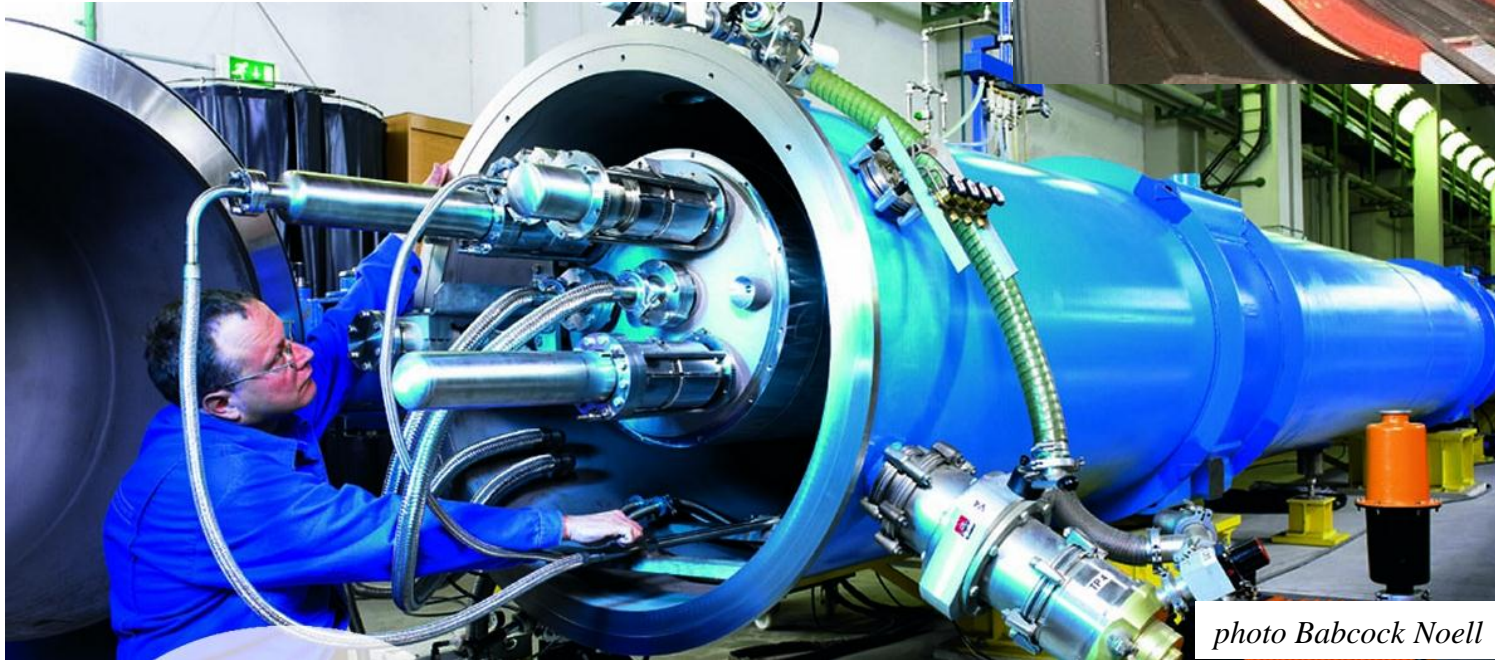
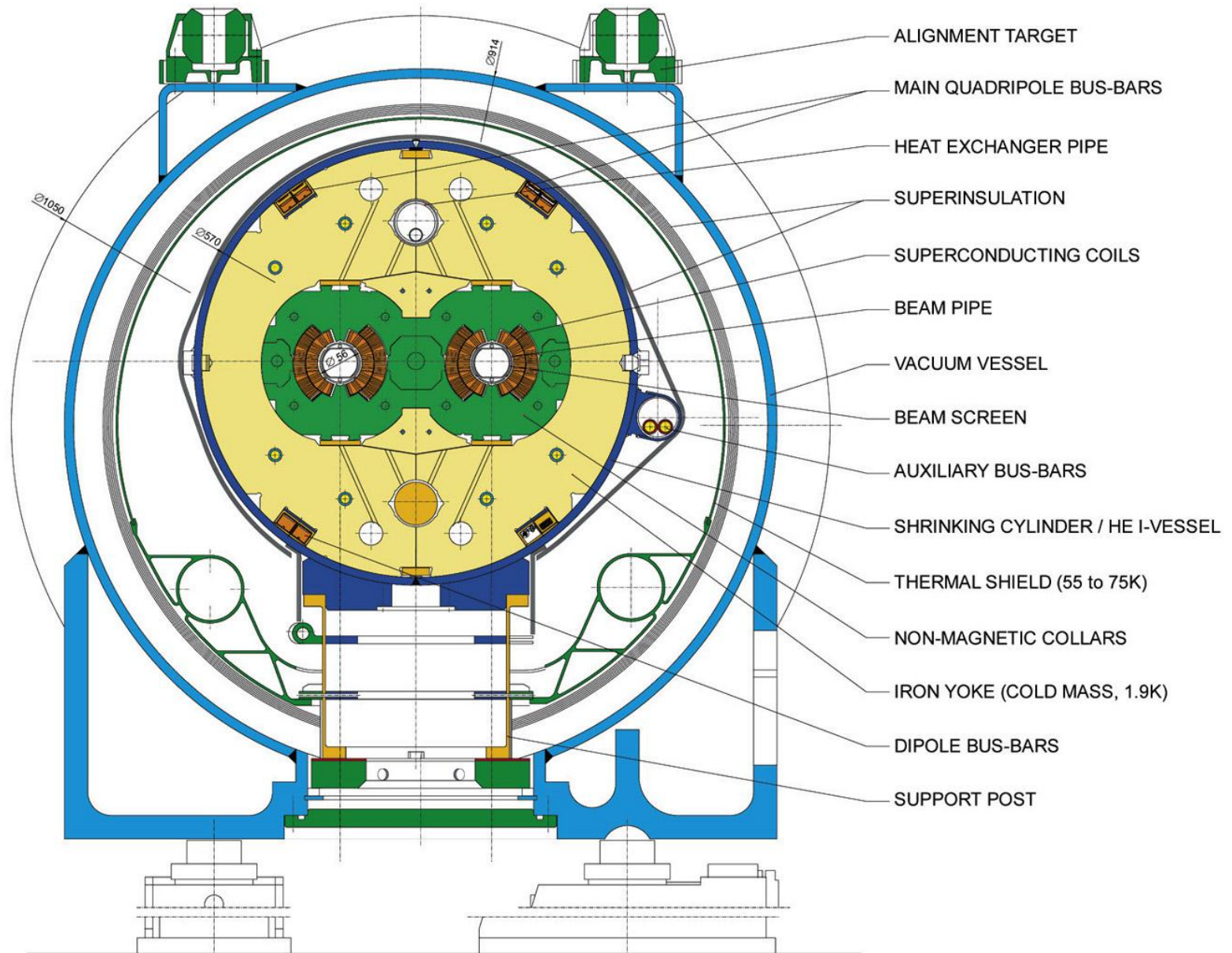


photo Babcock Noell

LHC DIPOLE : STANDARD CROSS-SECTION

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Make the interconnections - electrical

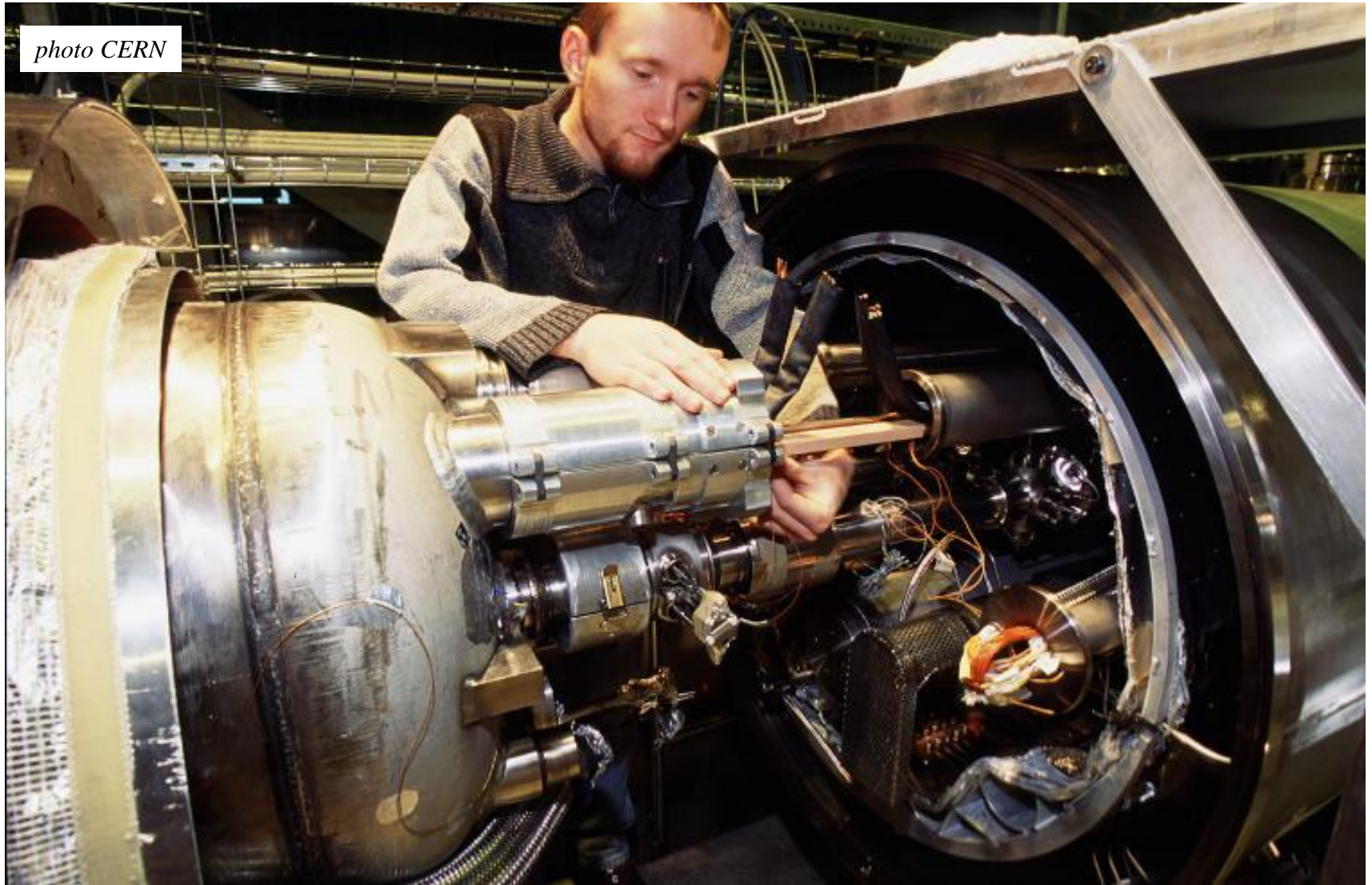
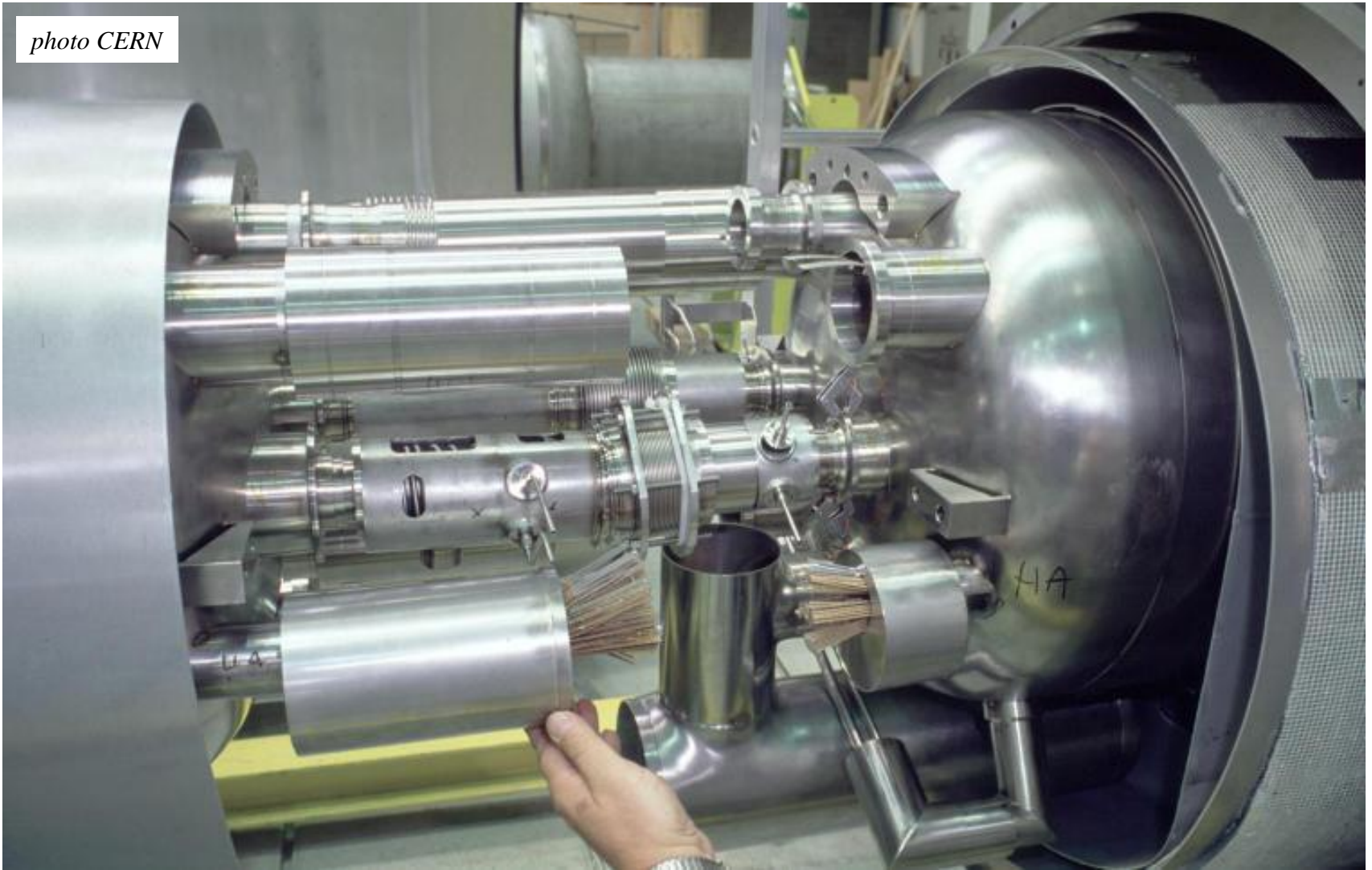


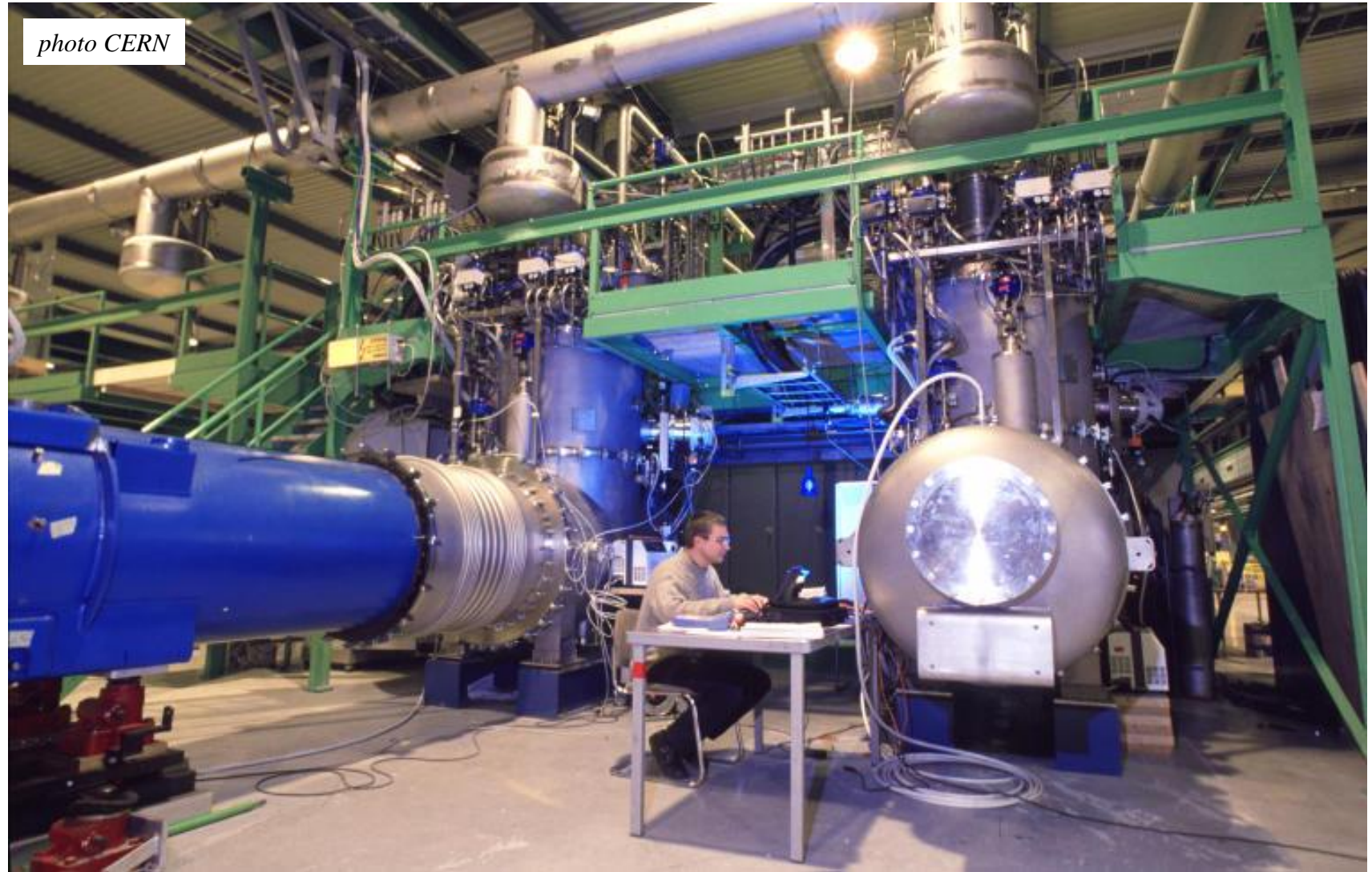
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Make interconnections - cryogenic

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Connect to the cryogenic feed and current leads



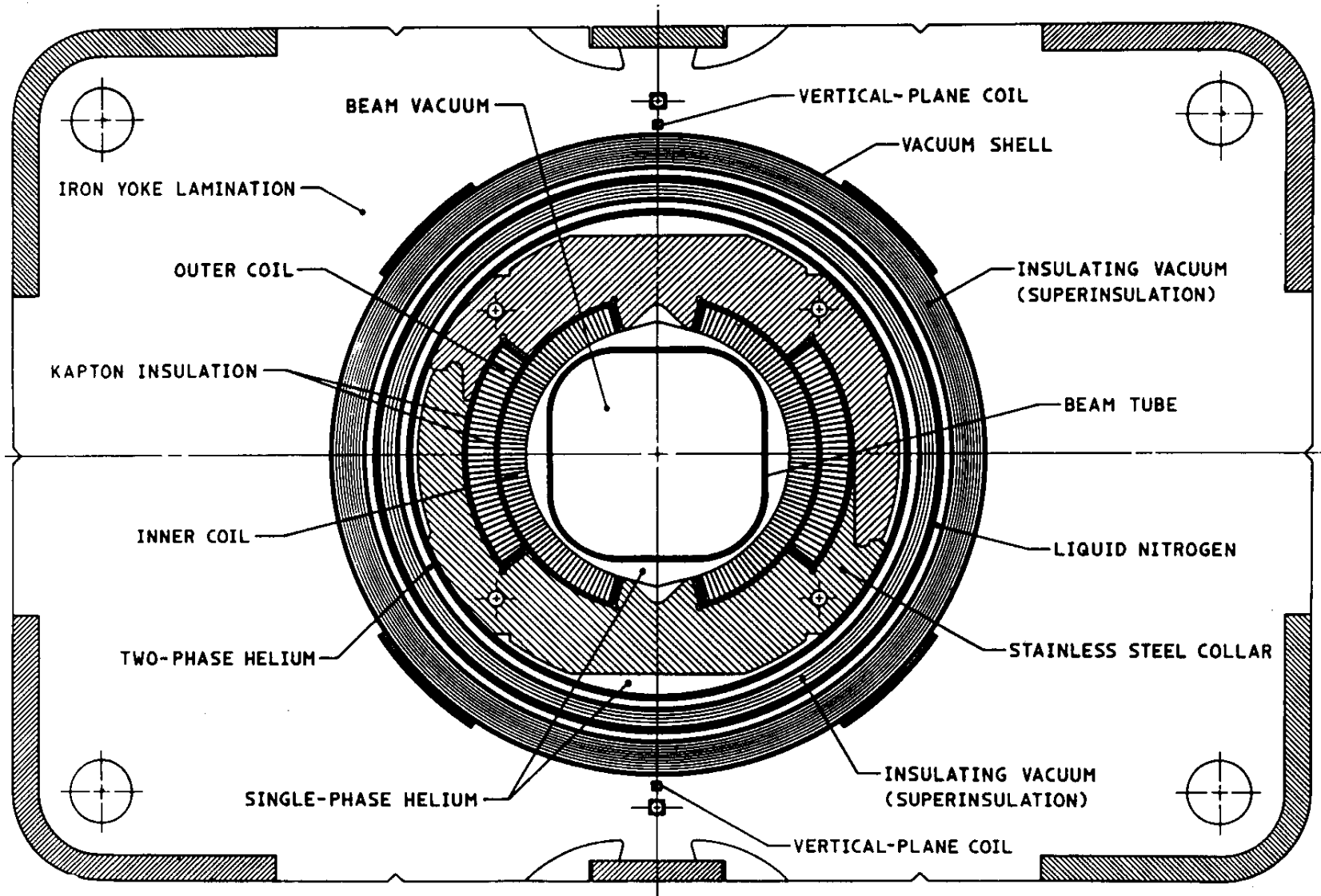
The Fermilab Tevatron



*the world's first
superconducting
accelerator*

photo Fermilab

Tevatron dipole



Hera

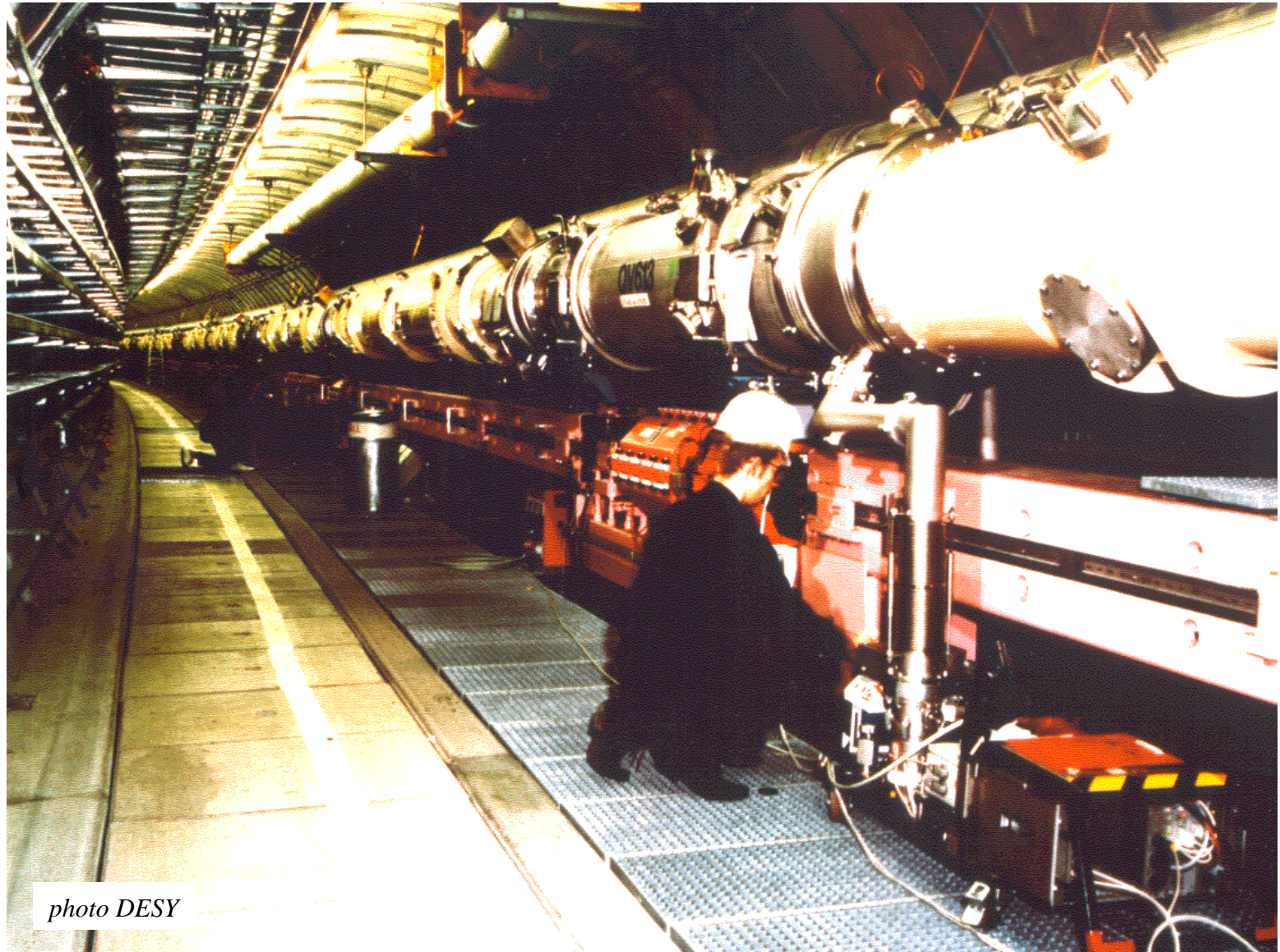


photo DESY