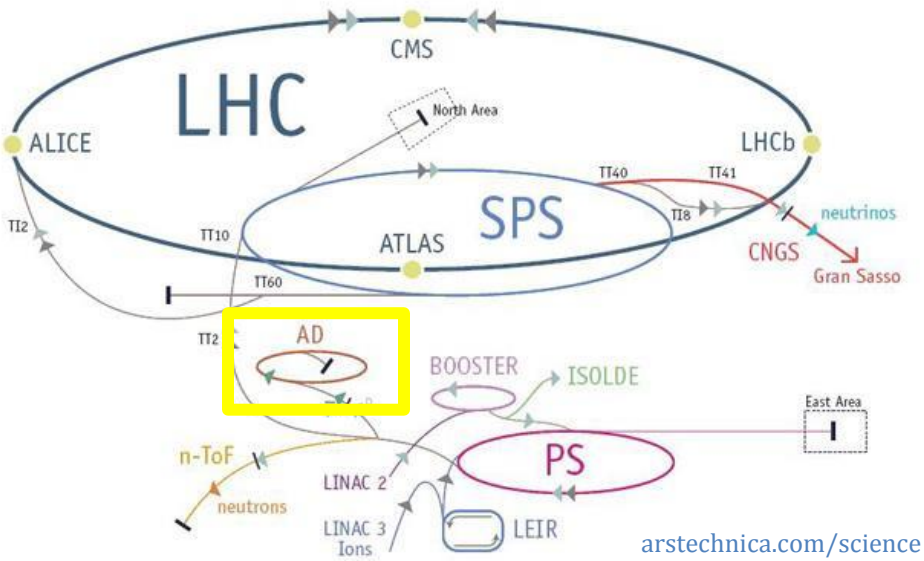
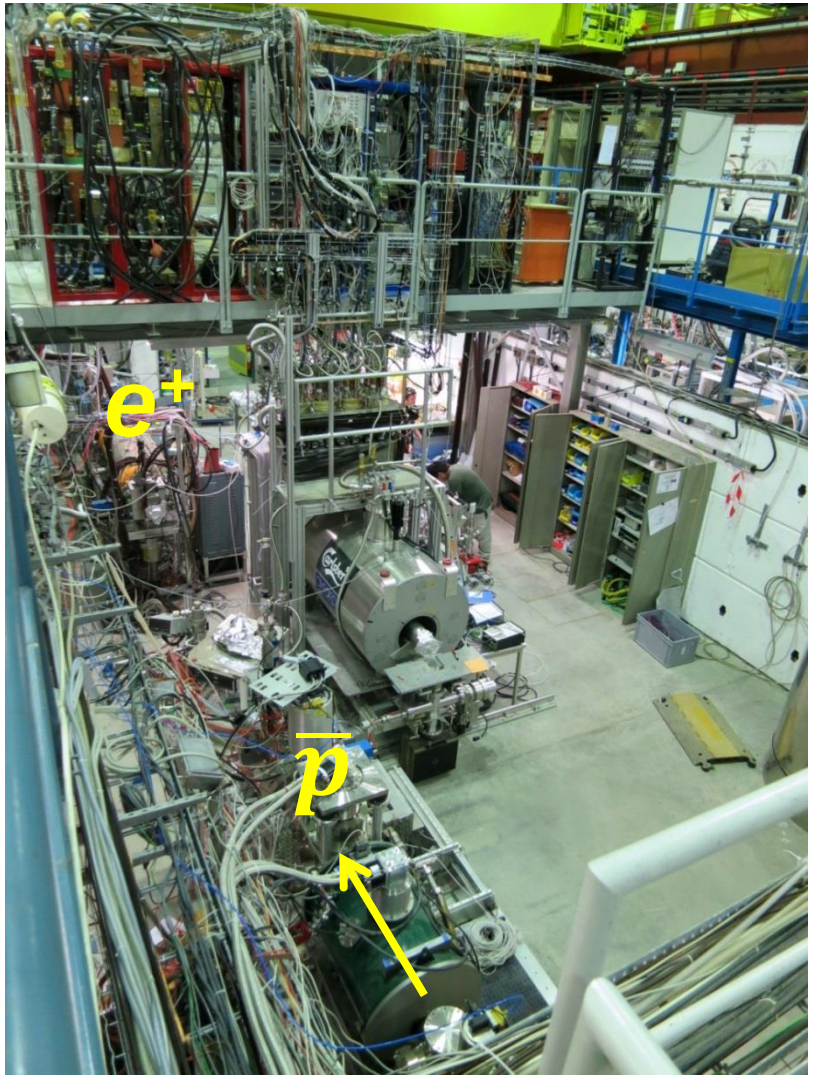
QUENCH PROTECTION

M. Hutcheson

The ALPHA Experiment

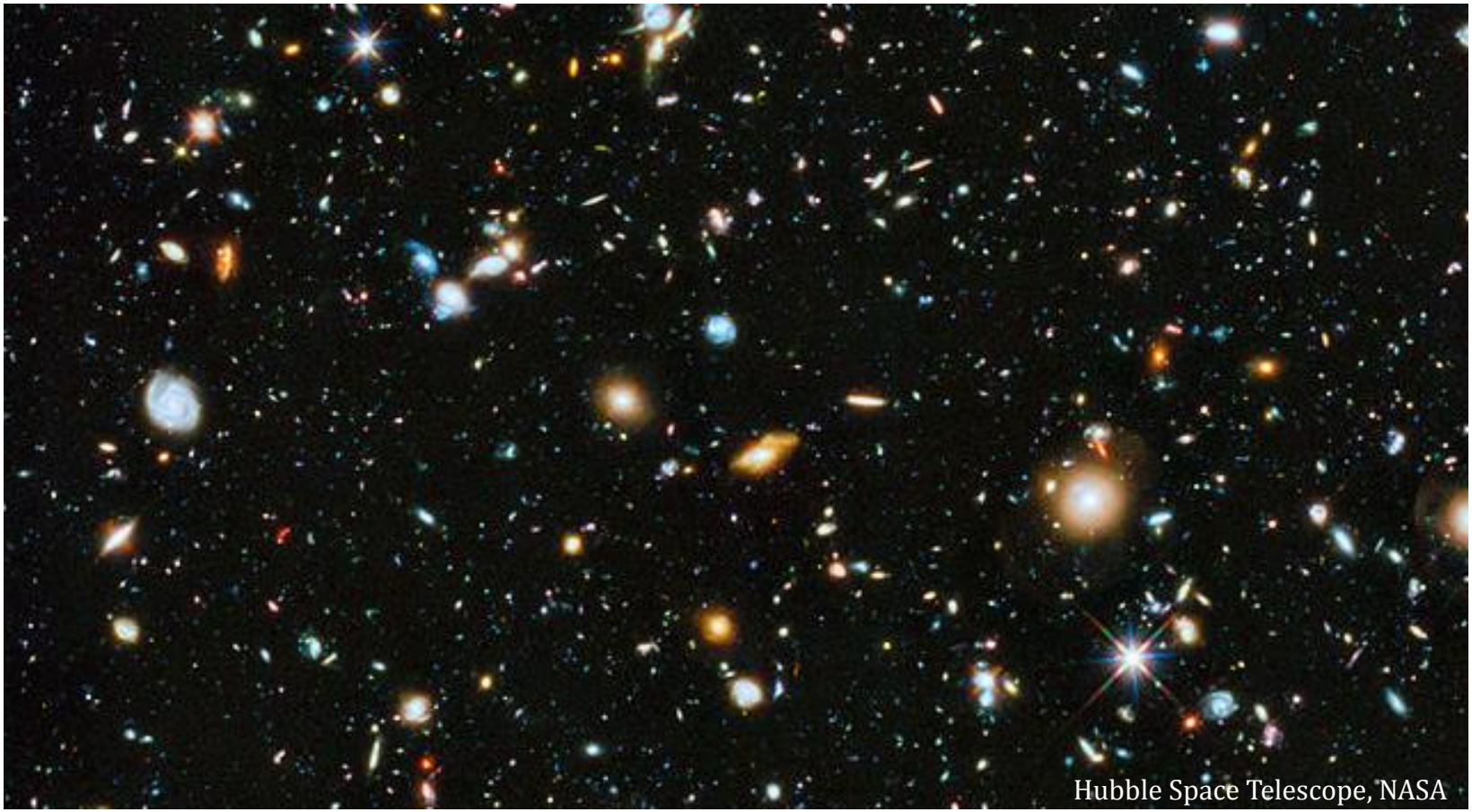




- Experimental Goals:
  - Stably create antihydrogen (2011)
  - Study symmetries between H and $\bar{\mathrm{H}}$
  - Investigate gravitational effects on $\bar{\mathrm{H}}$

Physics Motivation

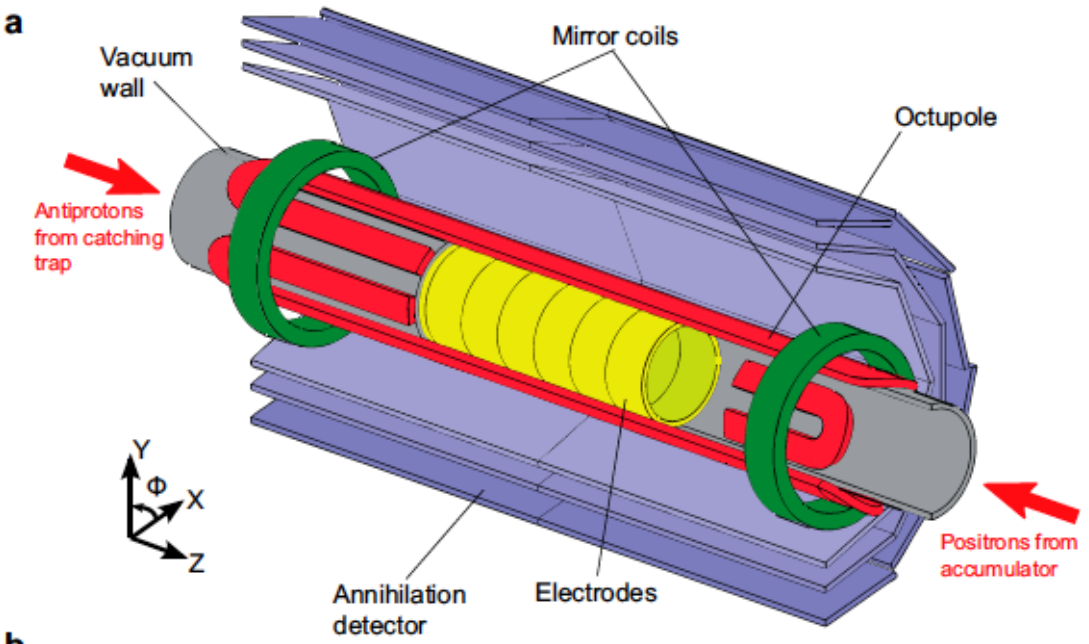
- Investigate CPT symmetry
- Test weak equivalence principle (gravity)



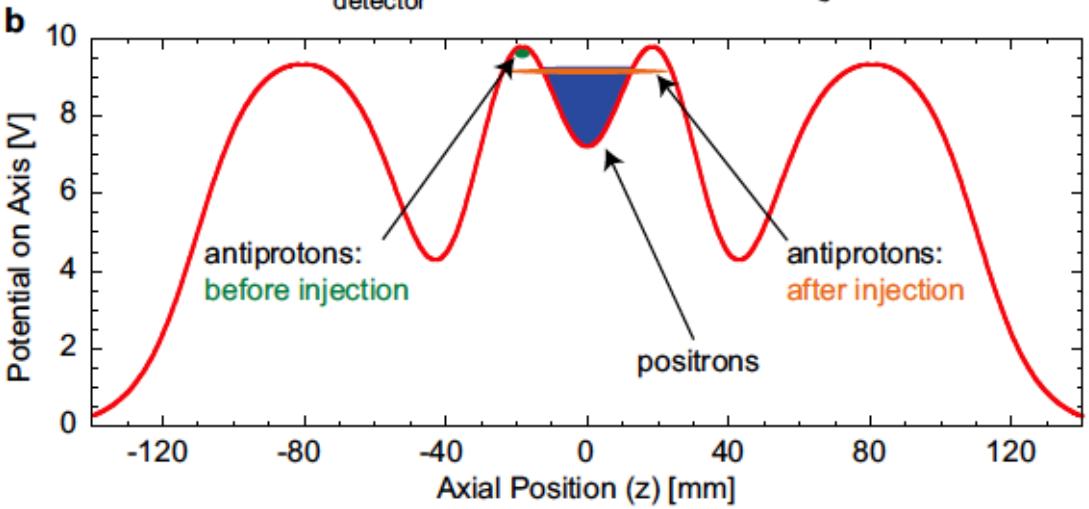
Experimental Setup

Andresen et al., "Trapped Antihydrogen", 2010.

- Low KE particles (~4 K)
- Magnetic trap (~1 T)
- Vacuum

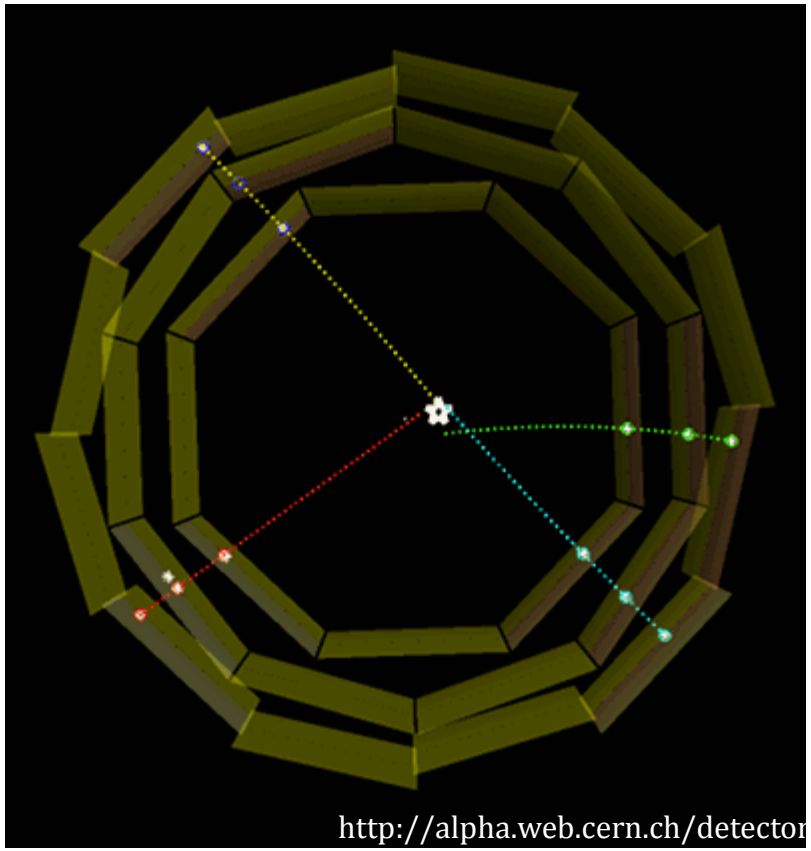


- Penning Traps
- Atom Trap
- Annihilation Detector

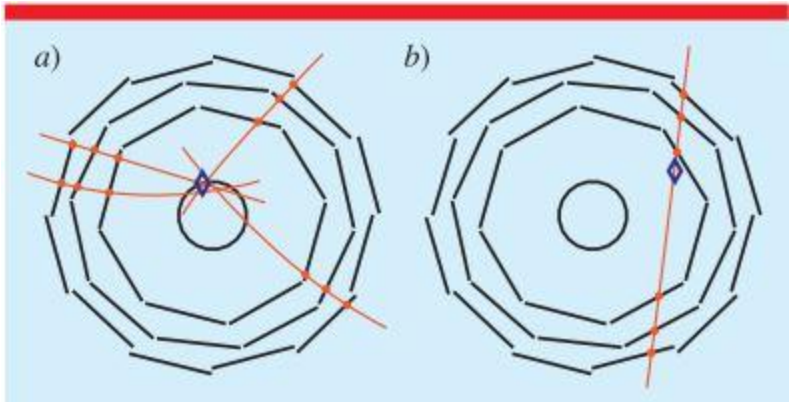


Experimental Setup

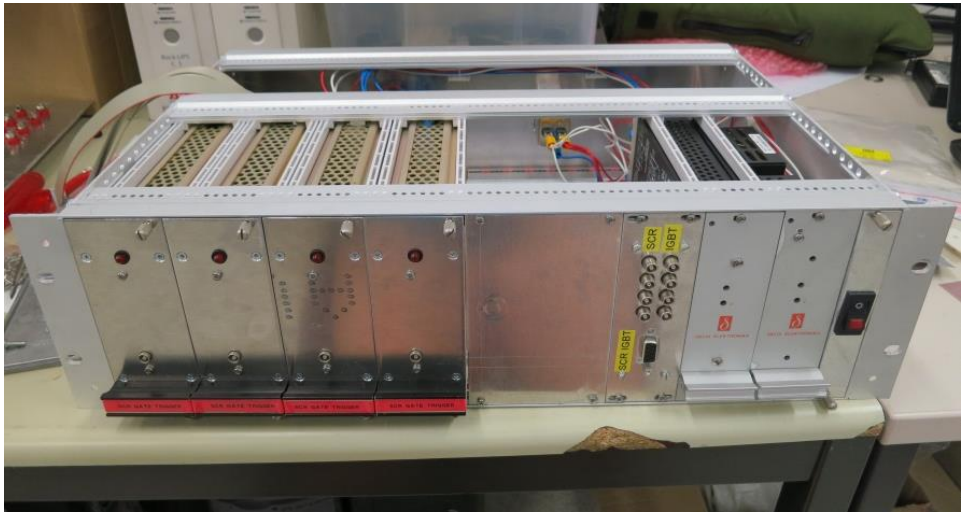
- SVD (Silicon Vertex Detector)
- Microwaves (hyperfine transitions in anti-atoms)

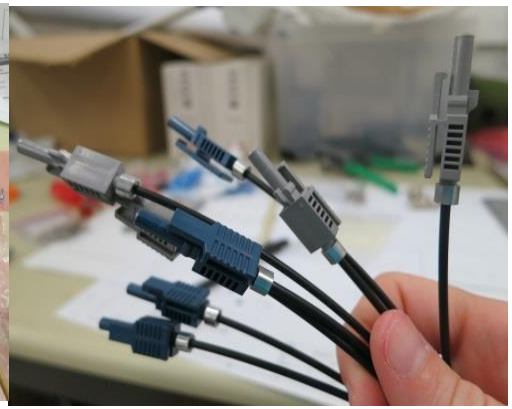


Charlton et al., "Antihydrogen in a bottle", 2013.

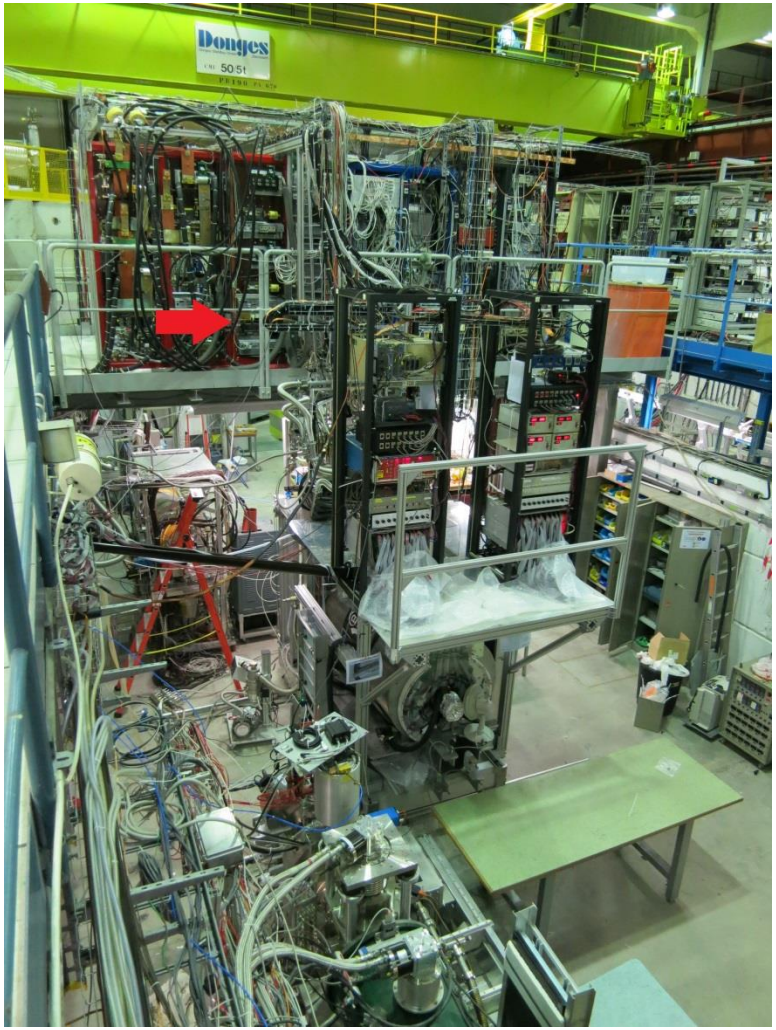


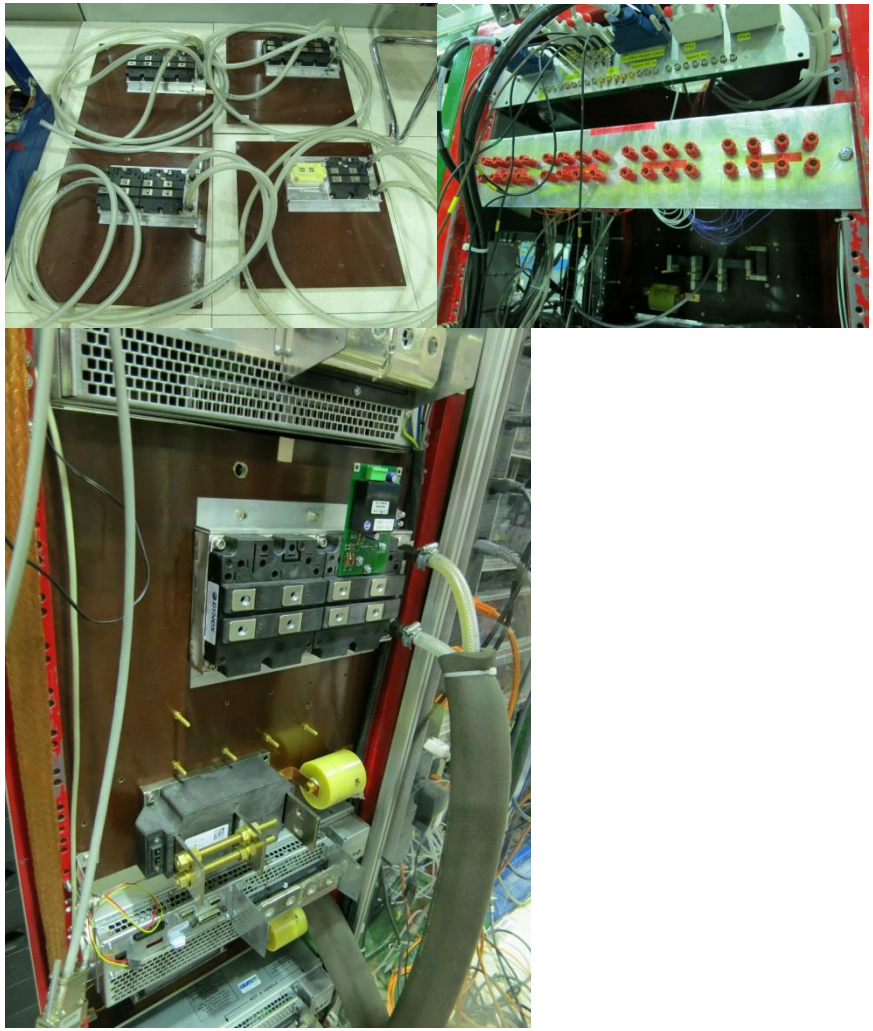
Quench Protection System





Quench Protection System





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- NSF

References

- Charlton et al., “Antihydrogen in a bottle” *IOP Phys Ed,* 2013.
- Andresen et al., "Trapped Antihydrogen" *Nature,* 2010.
- Madsen, Niels., “ALPHA: antihydrogen and fundamental physics” *LEAP 2013 Proceedings,* 2014.