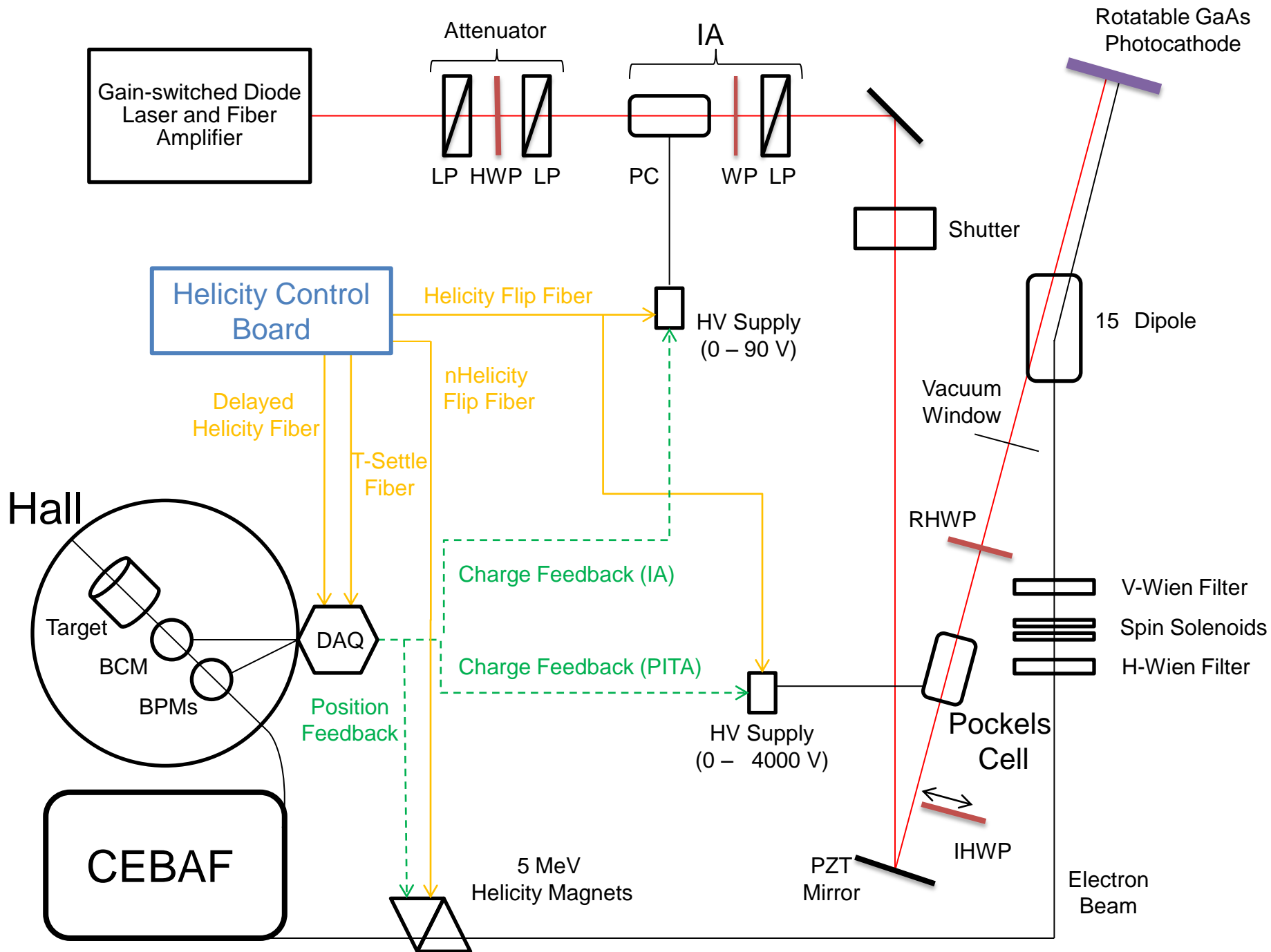


Electronic Cross-talk & Ground Loop Elimination in Injector

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Electronic Cross-talk & Ground Loop Elimination in Injector

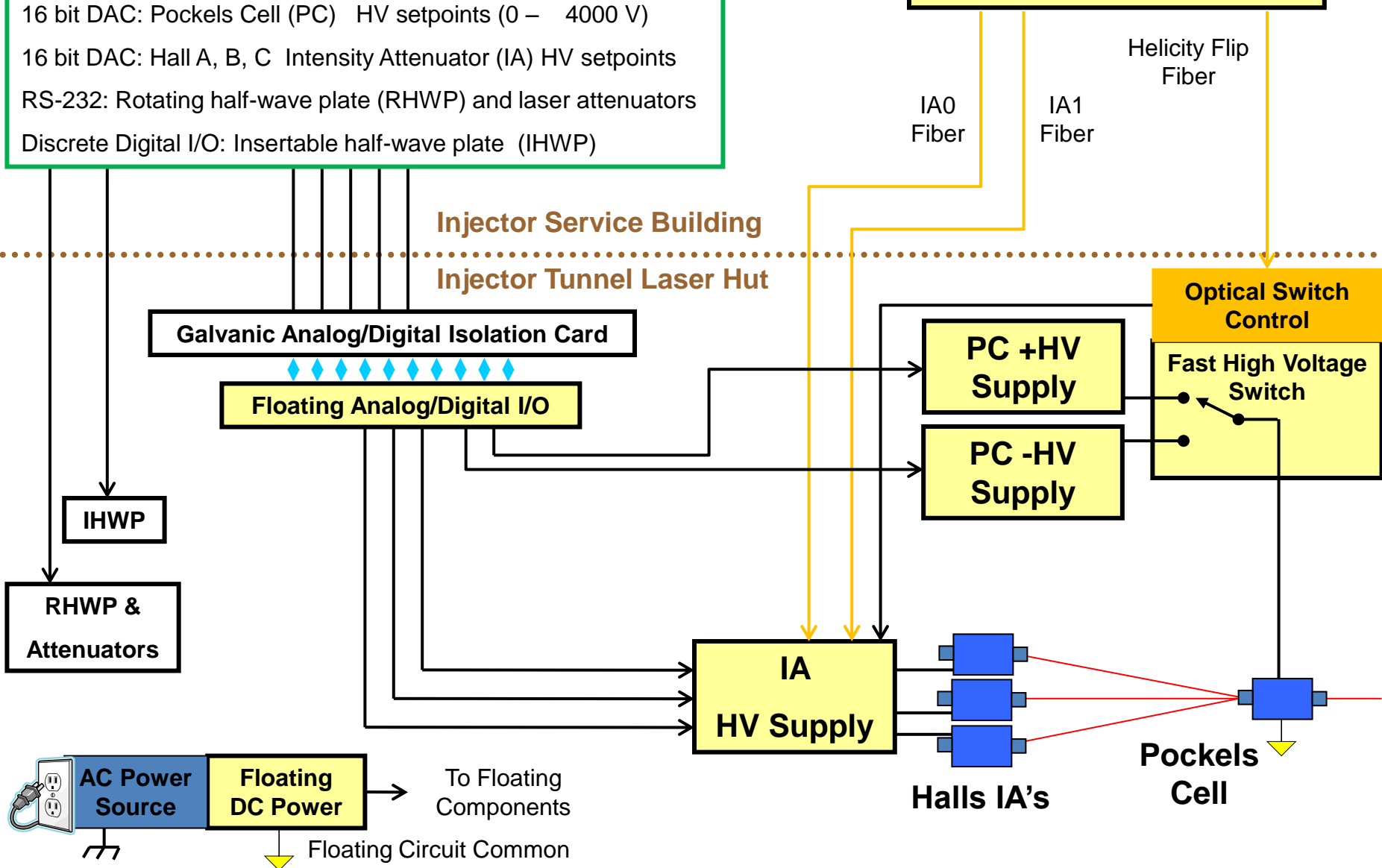
- VME Crate of Helicity Control Board is floating and powered with isolation transformer.
- Helicity Board generates two real time helicity signals: Helicity Flip and nHelicity Flip. Current drawn by board does not depend on helicity state.
- Helicity signal is generated by pseudo-random bit generator. No correlation between helicity signal and any other signal in Accelerator or in Hall.
- Outside world receives only Delayed Helicity signal. This signal tells what helicity was in the past so there is no knowledge of real time helicity.
- Helicity Magnets VME Crate which receives one of the two real time helicity signals (nHelicity Flip) is also floating and powered by isolation transformer.
- Real time helicity signal (Helicity Flip) that goes to Laser Hut is isolated. All electronics that can see real time helicity are floating (next slide).
- All helicity-correlated beam asymmetries (position, angle, charge, energy, and size – and thus beam scraping) are minimized so helicity is the only real time property of beam that is changing.
- Programming of voltage setpoints of Pockels Cell and IA's (both receive Helicity Flip signal) in Laser Hut passes through galvanic isolation card and there are no readbacks of these voltages.

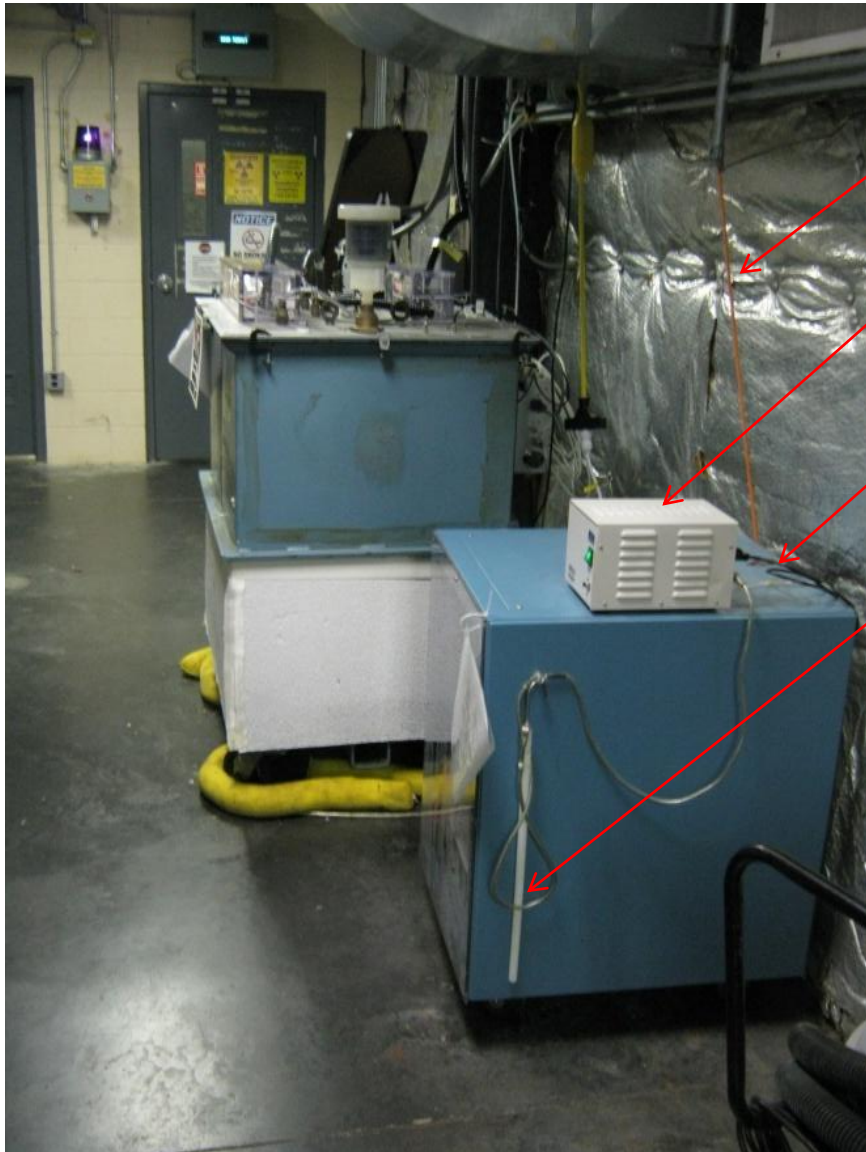
Normal Grounded VME CRATE

(slow status and control - nothing occurs at helicity flip rate)
16 bit DAC: Pockels Cell (PC) HV setpoints (0 – 4000 V)
16 bit DAC: Hall A, B, C Intensity Attenuator (IA) HV setpoints
RS-232: Rotating half-wave plate (RHWP) and laser attenuators
Discrete Digital I/O: Insertable half-wave plate (IHWP)

FLOATING VME CRATE

Helicity Control Board





Fiber Cable

Isolation Transformer

**Power Cable with
Ground Pin Cut**

Ground Rod

**Floating
VME Crate**



