

Moller polarimetry measurement

Dec 14, 2022

Don Jones

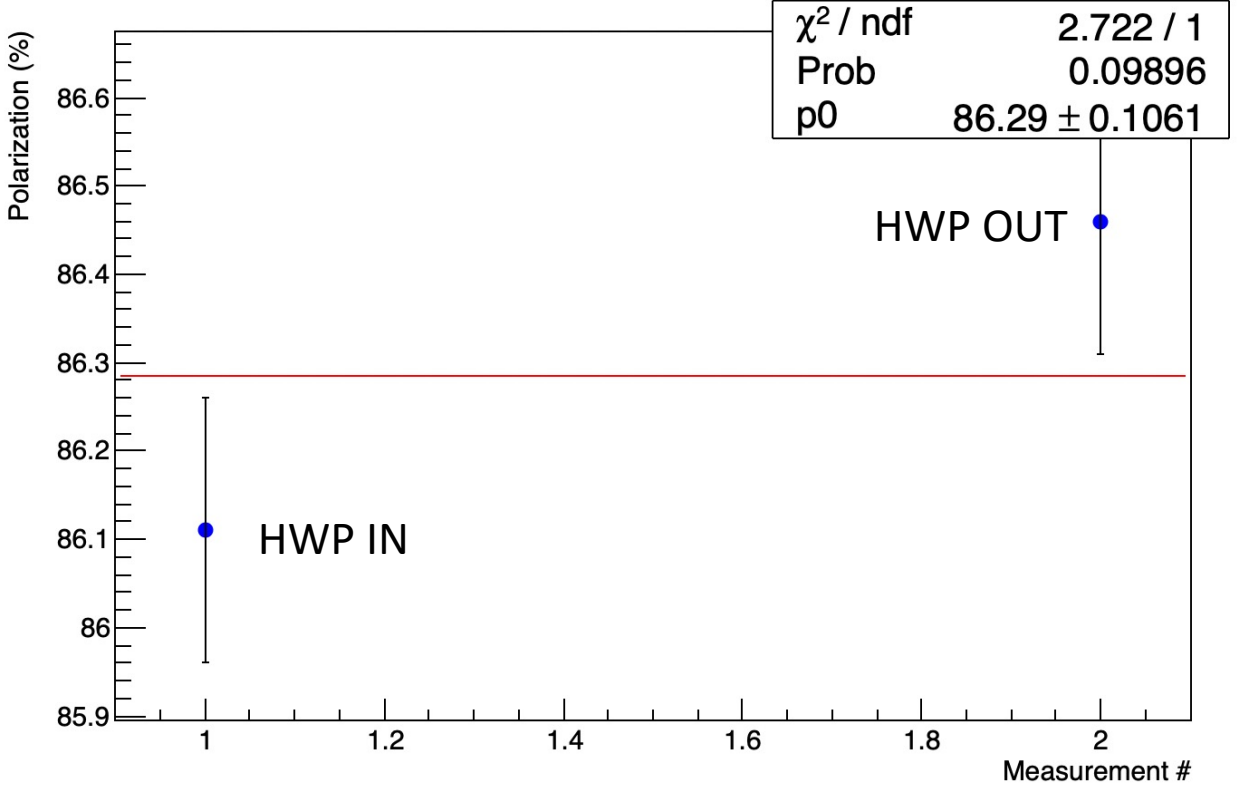
For the polarimetry team

Magnet quench

- In hindsight, after the target magnet warm up, it should have been cycled before going to high current
- Yesterday at ~10 AM it went through a controlled “quench” at 3.3T when we went straight to high current.
 - This magnet is designed not to quench in the usual destructive sense, but when it gets close to the point where it is going to lose its superconductivity, it goes through a rapid but controlled dump of its energy into the coolant over 1 second rather than a more rapid destructive dump into the coils proper.
 - This was the 53rd controlled quench this magnet has endured
- Took 4 hours to cool back down
- We started cycling the magnet around 3PM +30A to -50A to +66A which is 3.5 T where we took the measurement.
- At the end we successfully went to the full 4T at 75A and took a measurement there as well.

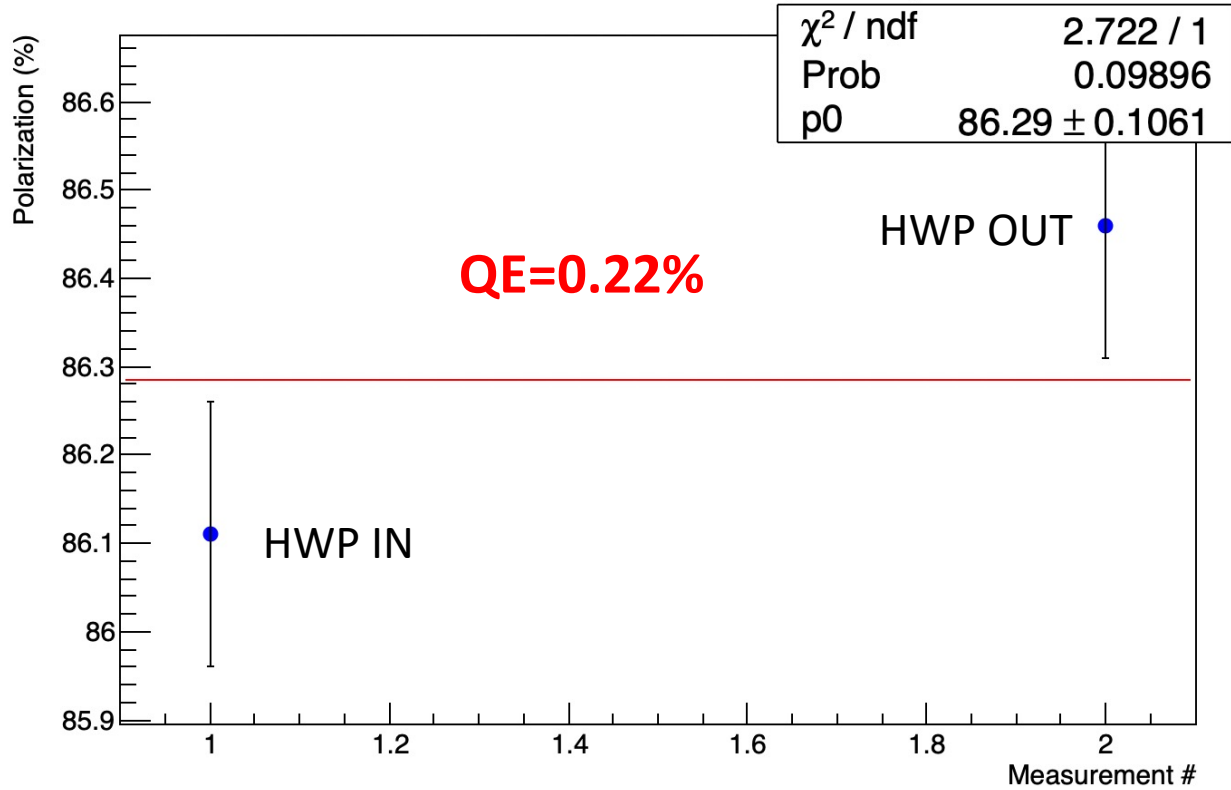
Polarization results at 3.5T

Polarization Measurement (Dec 13)

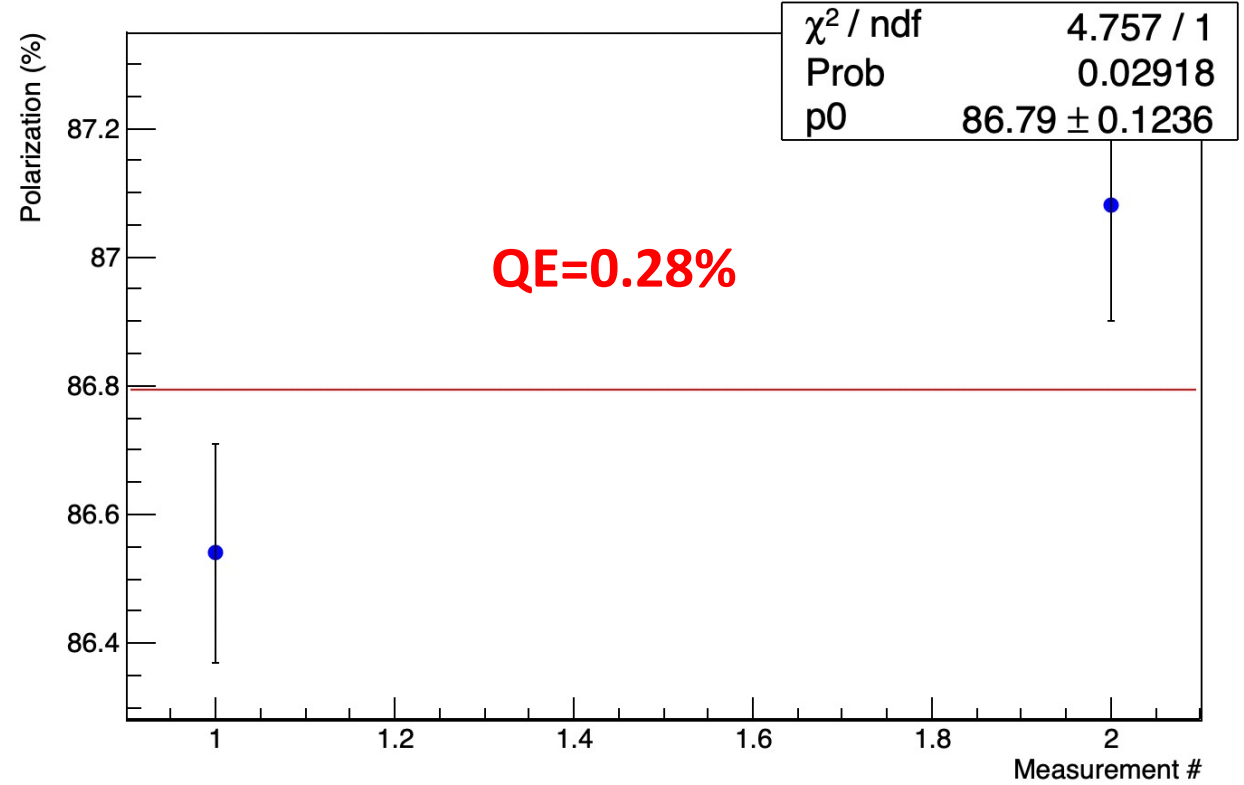


Polarization results at 3.5T

Polarization Measurement (Dec 13)



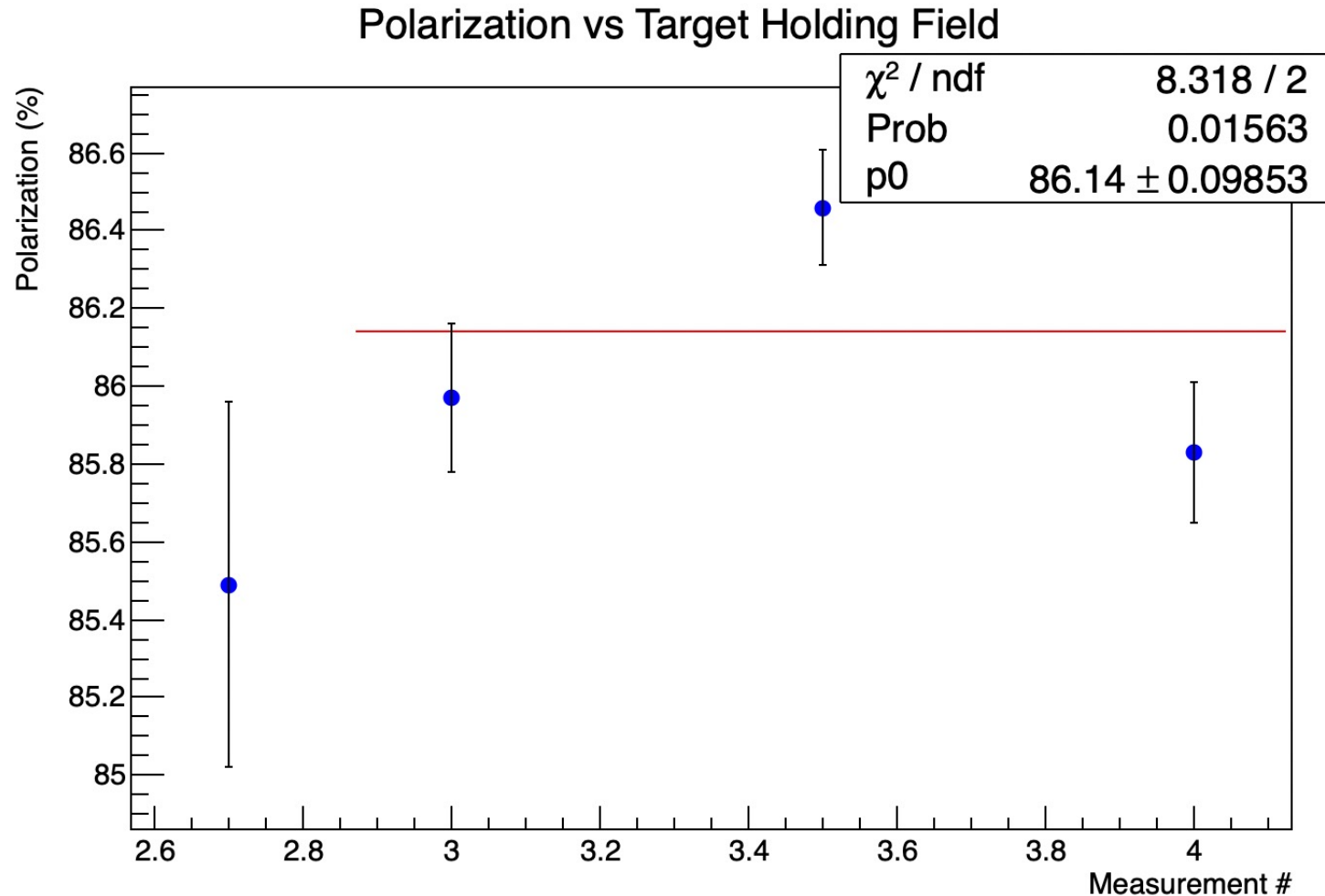
Polarization Measurement (Nov 17)



Measurement details

- Went smoothly: finished training the magnet at 5PM and called MCC to start the Moller program at 5PM. Polarization measurements completed around 9:30PM
- Accelerator worked well and the operator was efficient
- Decided to take a couple of systematic measurements instead of directly backing out: dead time and target saturation measurements.
- Dead time measurements are short but will need to be repeated.
- Called MCC to back out at 11:30PM
- Also measured bleedthrough from Hall C to be 0.1-0.14% of our signal so systematic error $<0.3\%$

Foil saturation measurements



The lowest three points appear to indicate we are not close to saturation at 3.5 T. The measurement at 4T is reassuring.