OLYMPUS Toroid

What do we need to know/measure?

Just some questions to start with:

- We probably don't want the relative uncertainty of the magnetic field not to exceed 10^{-3}
- What absolute uncertainty do we need? Maybe 1%?
- Normalization of measured current to magnetic field using the field map? Can we do this on teh 1% (?) level with the current measurement (?) for the field map?

Power supply has two DCCTs[1]:

- First DCCT is for the current regulation – signal internally used, not available
- Second DCCT is for the readout of the power supply output current – will be available via slowcontrol

Typical stability of such kind of power supply: at least $\approx 10^{-4}$
(this is what the DCCT should be able to do, too)
Second DCCT need to be tuned to match first DCCT (offset, slope): maybe $\approx 10^{-3}$

- Is this sufficient for us?
- Do we believe in the DCCT output?
  In principle yes, but the readout DCCT had problems, recently.

[1] DC current transformer

What else could we do to monitor the magnetic field?

- Hall probe
  Inexpensive, simple, available, but...
  Sensitivity to radiation? Stability? ...
- NMR
  No, we don't have a homogenous field!

A hall probe could be shielded by mounting it inside a couple of lead bricks.

If we have only the DCCT any drifts or fluctuations that we see on the toroid current in the slowcontrol could arise from

- Instability of the first DCCT
- Instability of the feedback loop that stabilizes the output current
- Instability of the second (readout) DCCT

In the first two cases the field is *not stable*, but at least we see something is wrong. In the third case we *only think* something is wrong, but the field is stable.
How do we treat the measured current when we don't know if the field *is* stable?
Yet another device (hall probe) would resolve this ambiguity.

Questions that need to be answered (let Y. Holler know the answers then):

- What is the *absolute* precision we need?
- What is the *relative* precision we need?
  - Fluctuations/drifts during a run
  - Relative deviations between runs with different beam species or field configurations
- Are we happy with the DCCT or do we (think we) need something else?

Conclusion?