FIELDMAPPER PROGRESS – WEEK ENDING 04/24/98

1 Magnet Meeting

We met Wednesday and discussed fieldmapper progress:

- The phi-handler parts came back and Adam completed the assembly last week. It works very nicely. The outer end of the caterpiller needs some attachment to the fieldmapper, but this can be "field installed" rather than "designed". The spacers for the plexiglas plate also arrived and were installed. The SST bolts should be replaced with brass ones.
- Adam has begun assembly of the z-handler – he has glued on the first trough.
- Adam assembled and installed the cable carriage. It interferes with the brackets and z-handler bars attached to the center beam, and the wheels do not grip the beam at all well.
- Gene will arrange a meeting with Jim re the installation schedule. We need to work out our own time needs before the meeting. At present Del is waiting for surveyors to install the preshower detector modules.
- Miguel has shown that the 303 rails I ordered are magnetic. Back to the drawing board!
- The use of NMR probes in the detector was discussed. It may be very undesireable to operate them during data taking!
- Gene suggested the new PC go to the fieldmapper and the old 486 go to IB1 for the probe/NMR work. This means Adam and Miguel will need time to get everything installed on the new PC, but in the long run it is best to have the best PC on the fieldmapper.
- Rich notes that the Toshiba laptop should soon come to us full-time. For now Ryuji and Adam time-share it in IB1.

2 Cable Handler Redesign

- Adam received the reworked brackets for the caterpiller for the phi-handler and completed the assembly of the system. It handles the cables during phi-motion VERY nicely, as modified by him and Miguel (they left off the phi-ring as it is unneeded). Note also the inner phi-ring is not permanently mounted until we decide how the revised carriage will be mounted.
- Assembly of the z-handler continues (the trough brackets are installed since Adam got the pads glued on earlier.)

3 Hall Probe Carriage

- Rich gave Pat a sketch of his ideas for a revised carriage that rides on linear bearings, and incorporates an encoder. She had begun a layout of the system in elevation. Her first stab didn't show a useful sub-chassis for the encoder, so she will revise.

- The linear bearings came; the rods are somewhat magnetic, as tested with one of Rich's refrigerator magnets, and quite magnetic as tested by Miguel in the lab magnet at 2 T.

- Rich called shops (Jim Schmid x3719) re making brass rods: centerless ground to 8–16 rms, 0.5 inch dia, 10 feet long. He said we fill out a job req form and his secretary would call around their favorite shops to see what could be done. Or we could call people in fab-procurement (e.g. Nelson Sample). Rich called Nelson and he got onto the problem immediately; later in the day he called and said he had a vendor and for $600 we would get 3 10 foot brass rods! (and a quote was on its way). On Friday the quote came so Rich wrote out a req to "Centerless Grinding Com. Inc. in Franlkin Park.

- Rich talked to Carl Lindenmeyer re bearings and shafts. He noted that aluminum rods can be centerless ground, then anodized. Perhaps Rich will pursue this as a fall back in case the brass is too heavy for the fieldmapper.

- Rich sent an e-mail request to Gurley re their enclosed "Pathfinder" linear encoder, and "Pointfinder" readout. On Friday he received the Gurley catalogue, after calling CADRE, 630 920 0200, Don Merritt.

- Rich finds Sterling/Stock Drive has "Frelon" lined linear bearings in exactly the same size as the PIC ones he already has, so he ordered 4 of them (%Rockford Controls, Downers Grove, Dave Kintecky).

- Rich find Velmex uses Acurite linear slides and Metronics readout for one of their custom products, so he has looked a bit into an encoder readout that provides a digital display and RS232 port. (None of the vendors has GPIB output!). Since the existing Compumotor uses the Serial Port, we have looked a bit into seeing if there is a way to hook a second serial device to the PC. There are dual serial port cards, and it looks like the Labview software can address both. Also there are RS232 – GPIB conversion boxes (Rich finds one by Iotech, and Adam finds one by Natl Instruments. We are pursuing these leads.

- Rich contacted Acurite (Gary Steinberg, garys@acu-rite.com) about their 10 micron (0.0005 in) slide – it is $2250 (ENC-150). Stock lengths are in 10" increments, overall length 6 3/8 greater than "active" length, and delivery is normally 2 weeks. They are mostly aluminum but there are some ferromagnetic fasteners, and a special spring suspension (a ball bearing on a spring wire), plus the armored cable option has a steel strain relief spring on it. Gary will ask his bosses about making a custom unit with no magnetic components – some R&D will be needed for the spring though.

4 Hall Probe Arm

- Miguel has worked out a hall-probe placement scheme, and has considered how to calibrate them once they are mounted. He will have the r and z probe pairs at the same z so we can measure dBr/dr, dBz/dr, and of course the dz derivatives too. So we can check Maxwell as the data rolls in. (The availability of the derivatives also means we can correct r and z offsets!

5 Hall Probe Calibration

- Miguel finds the oscillations in the new data are somehow "damped" with rotation angle. He will take more data, but maybe the probe holder is just too imprecise.
- For a better probe holder, we need better motion tables (we need three axes linear, plus one axis rotation). I talked to Ron Lipton about some of the SiDet stuff stored in Lab A (he says go see Greg Sellberg), and Lab D. Carl Lindenmeyer noted that he knew David Anderson at one time had such stuff in his lab in WH14 (but that lab had since disappeared, and John Kryder was using Renishaw endcoders for the D0 fiber polishing apparatus).
- Rich talked to Alan Bross (who said all David's remaining stuff went to Lab 6) and he brought us a 2 axis slider (5 cm stroke with micrometers).
- Rich went past Kryder's office but he was out. All his activities are now in Lab 3.

6 Field Calculations

7 NMR R & D

- Ryuji and Jim now have found the resonance signal. At first it was coming from the Metrolab device; that is now fixed and the resonance point tracks the magnetic field OK.
- A copy of a note from RY:

  Date: Wed, 22 Apr 1998 07:10:42 -0500 (CDT)
  From: Ryuji Yamada {yamada@fnal.gov}
  Subject: 21 Apr 98 (fwd)
  To: hefisk@fnal.gov, rpsmith@fnal.gov
  Cc: stephen@fnal.gov, yamada@fnal.gov

  Gene and Rich,
  Jim alone took more data and better data yesterday afternoon, since I and Jim confirmed the first NMR signal yesterday morning.
  Ryuji

  ———- Forwarded message ———-
  Date: Wed, 22 Apr 1998 05:45:14 -0500

From: Jim {raph@fnal.gov}
To: yamada@fnal.gov
Cc: bobj@fnal.gov
Subject: 21 Apr 98

Ryuji:

I took down the data for 60,70,80 and 90 MHz. The signal was about a volt or a little more. Yes, there was a lot of noise from the network analyzer. There is some possibility that the scan type can be changed for it, but it might be easier to just go to the other sweep generator.

I can give Hewlett-Packard a call tomorrow morning and ask an engineer about which way would be best. I also have the NMR schematics I got from Dean at WH9E to look over and return.

As usual I might do some writeup at WH until around 8-9AM, grab a break and go to IB1.

BTW the resonance was enhanced (at least in appearance) by altering the scan rates and the repitition rates. Tuning was very crucial to finding the resonance, and that depended directly on the frequency. Tuning does not have to be done manually every time, that could be done with a DAC through LabVIEW also.

One of the tradeoffs is that with the network analyzer, what looks best on its display does *not* look good on the scope. However once a good representative trace is acquired by the analyzer and sent to LabVIEW, that can be easily displayed making the storage scope unnecessary (at least for the signal). The storage scope is very unwieldy unless we know what to look for in the first place because of noise and aliasing of the trace data, which we really can't get around because of the way it handles data which aren't in real time.

I may see if I can find a scope camera for the storage scope. The signal can be very clear under the right conditions, about 10x or more than the background noise. Then I have to see about parsing the GPIB data in LabVIEW. Let me know if you want to stick with the network analyzer or try out a setup with the frequency generator. I haven't sent anything to Giovanni; I am sure he will be pleased! :-)

Cordially, Jim

8 Schedule

9 Installation

10 New Collaborators

- Gene has contaced the NIKHEF group about their hall probe work, and they might/can contribute to our effort. Rich will contact them ASAP.