

Subject: Pulsed Magnet Baseline, etc.

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This note reminds us of the

1. Baseline Parameters for the 15-T pulse magnet.
2. Presentation to the Tech Board on Feb. 9.
3. Meeting schedules prior to Feb. 9

--Kirk

1. Baseline Parameters:

The project goal is a pulsed magnet with 20 cm diameter bore capable of a peak field near 15 T and a repetition rate about 30 minutes.

In the final design process, maintaining a good repetition rate will likely be more important than reaching the absolute maximum field.

Funding realities make it prudent to consider a stageable design with initial options for use with only a single 540 kVA power supply, and LN2 cooling of the heat exchanger. However, design optimization should emphasize performance at 30K with 4 x 540 kVA power supplies.

- 1) Coil material: Copper
- 2) Forced He Gas cooling; 100 gm/s @ ~1 atm
- 3) LH2 cooling of the heat exchanger for magnet temp of ~ 30K
- 4) 20 cm coil ID; ~ 80 cm coil OD
- 5) 100 cm coil length
- 6) Uniform bore
- 7) Layer winding -- axial cooling
- 8) Power supply built from 4 AGS 540 kVA PS (3.6 kA, 150 V each)
- 9) Option to use LN2 cooling of the heat exchanger, pumped to 65K.
- 10) Option to power the magnet with a single 540 kVA supply.

Samples scenarios, beginning with 1 PS and LN2 cooling, leading up to 4 PS and LH2 cooling:

	Pool Temp deg K	Magnet Temp deg K	PS	Bmax T	del T deg K	del E MJ
case 1	66	84	1	5	7.2	3.2
case 2	66	74	4	10	26	10.7
case 3	21	30	4	14	62	22
rep rate case 1	6 min					
rep rate case 2	20-40(?) min					
rep rate case 3	30-50(?) min					

For the Tech Board presentation on Feb. 9, preparations should emphasize the above baseline.

Bob Weggel will continue to examine alternate scenarios, but engineering design by Iarocci, Marneris and Titus should be restricted to the above Baseline Parameters for the time being.

In thinking about alternatives, important boundary conditions are project cost and magnet repetition rate. Therefore, the most interesting alternative of which I am aware is Bob W.'s suggestion to use 1, 2 or 3 540 kVA supplies that are switched between inner and outer subcoils. Switching also would permit dumping to the magnet current more quickly, and hence less total heat generated.

Another alternative that may be considered is He pump rate of 150-200 gm/s.

2. Tech Board presentations, Feb.9.

We are currently scheduled to present E951 issues to the Technical Board of the Neutrino Factory and Muon Collider Collaboration from 8:30-12:30 on Saturday Feb. 9.

The location is somewhere in downtown Chicago; details to be announced later.

A tentative list of speakers is

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|----------------------------------|--------------------------|
| 1) Introduction/Overview of E951 | -- K. McDonald (30 min) |
| 2) Simulations | -- R. Samulyak (15 min) |
| 3) Pulsed magnet concepts | -- R. Weggel (15 min) |
| 4) Power supplies | -- I. Marneris (15 min) |
| 5) Cryogenics | -- M. Iarocci (15 min) |
| 6) Coil design | -- P. Titus (15 min) |
| 7) MIT Design Study | -- J. Minervini (15 min) |

Coffee Break (15 min)

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|------------------------------------|-------------------------|
| 8) E951 studies in A3 Beamline | -- H. Kirk (15 min) |
| 9) AGS intensity upgrades for E951 | -- T. Roser (15 min) |
| 10) Summary | -- K. McDonald (15 min) |

General Discussion (60 min)

The presentations should explain technical details crisply, as well as indicate desirable budgets and schedules for the rest of FY02 + FY03 (and FY04).

For FY02, Marneris and Iarocci should propose activities funded by \$50-60 each, and Minervini/Titus should justify the MIT design study at the level of \$90-100\$.

Their presentations should address what budget would be required to have a fully operational pulsed magnet at the end of FY03 -- as well as an alternative that completes the magnet in FY04. => We should, of course, discuss this prior to Feb. 9!

I can subsidize travel arrangements for the Feb. 9 meeting, on a Princeton/BNL account. For this, contact Kathy Tuohy at BNL, 631-344-3845, tuohy@bnl.gov

3. Our next magnet group meeting is 1-2 pm, Friday, Jan 11.

I am at CERN the week of Jan 14. If appropriate, Juan Gallardo might convene a magnet meeting on Jan 18.

We should holds meetings on Friday Jan 25 and Feb1.

We plan to hold a preview of our presentations at BNL on Thursday Feb. 7. I understand that it is probable that Peter Titus could be at BNL that day. Of course, Joe Minervini would be most welcome to join us then as well.