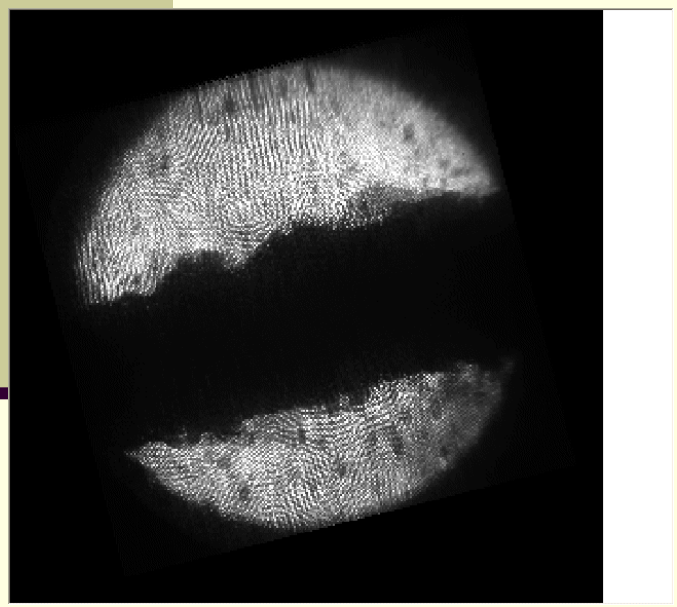
The MERcury Intense Target Experiment – or nTOF11



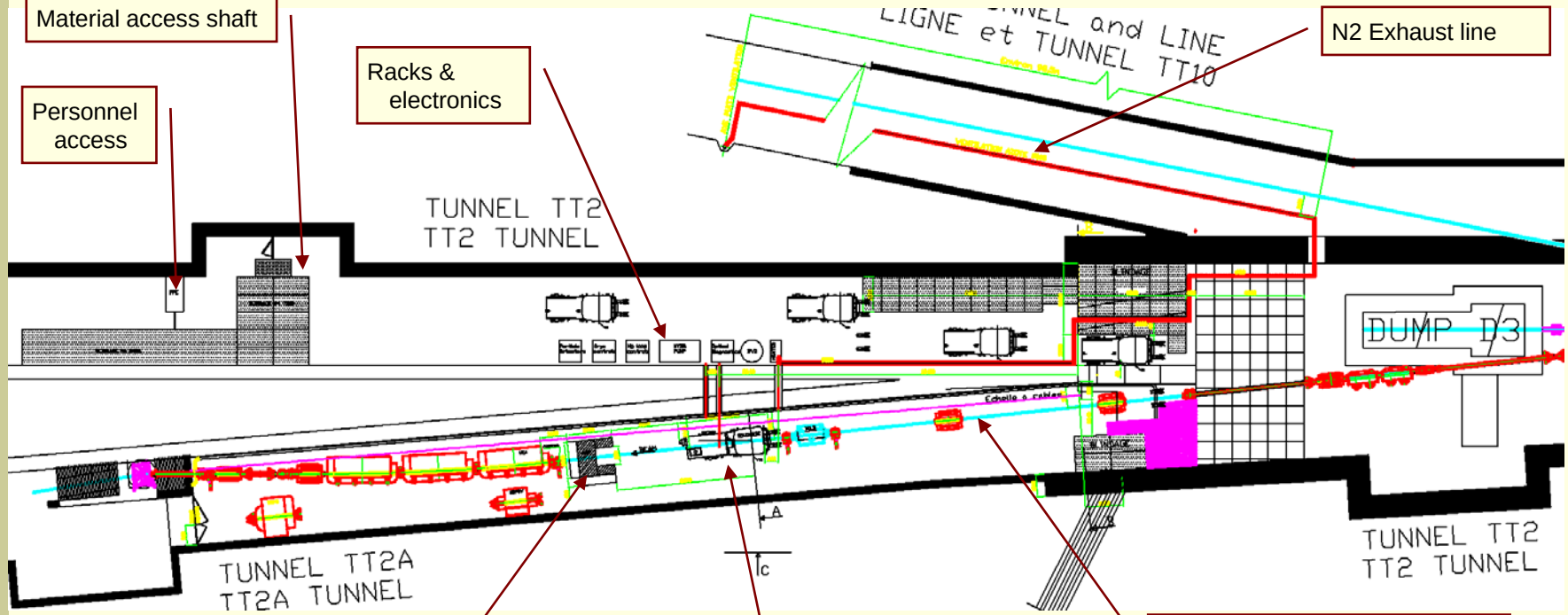
20m/sec Hg jet achieved on February 14, 2007
MERIT Collaboration – ORNL test setup

I. Efthymiopoulos – CERN, AB Dept.

(for the MERIT collaboration)

ABOC Meeting
CERN – May 15, 2007

MERIT Experiment – Layout

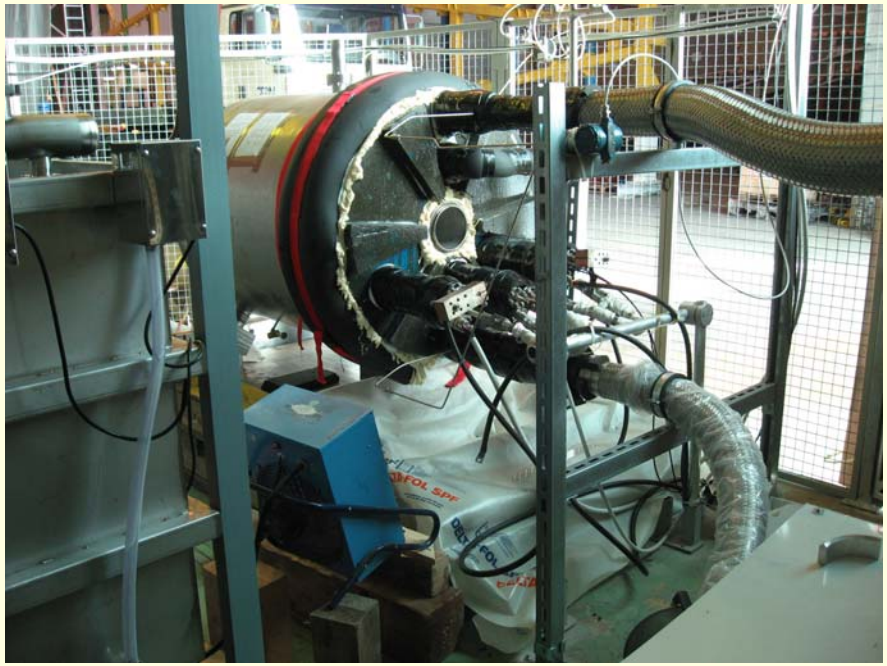


Some photos…

TT2/TT2A tunnels…

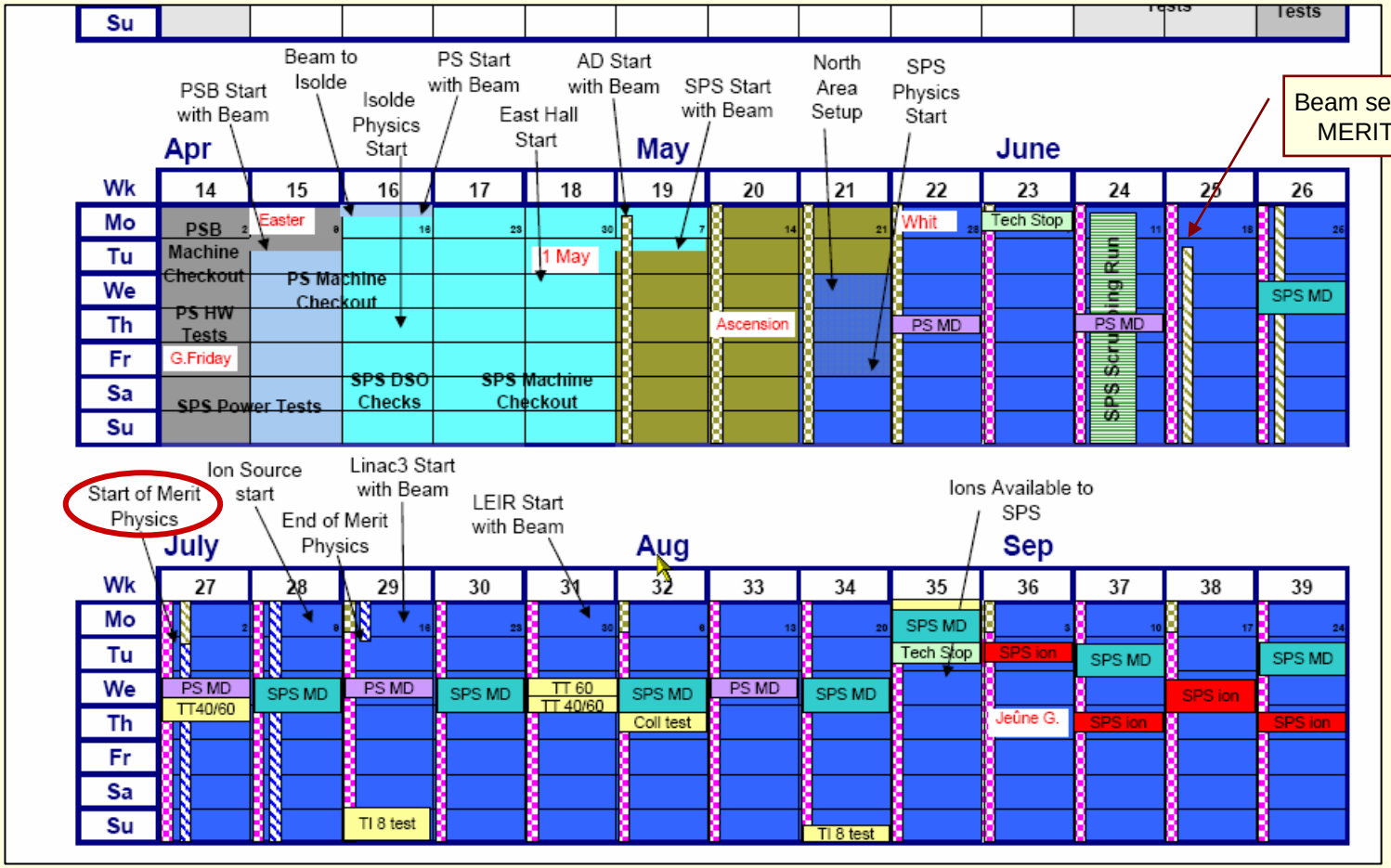
Some photos..

Cryogenics test setup in build.180

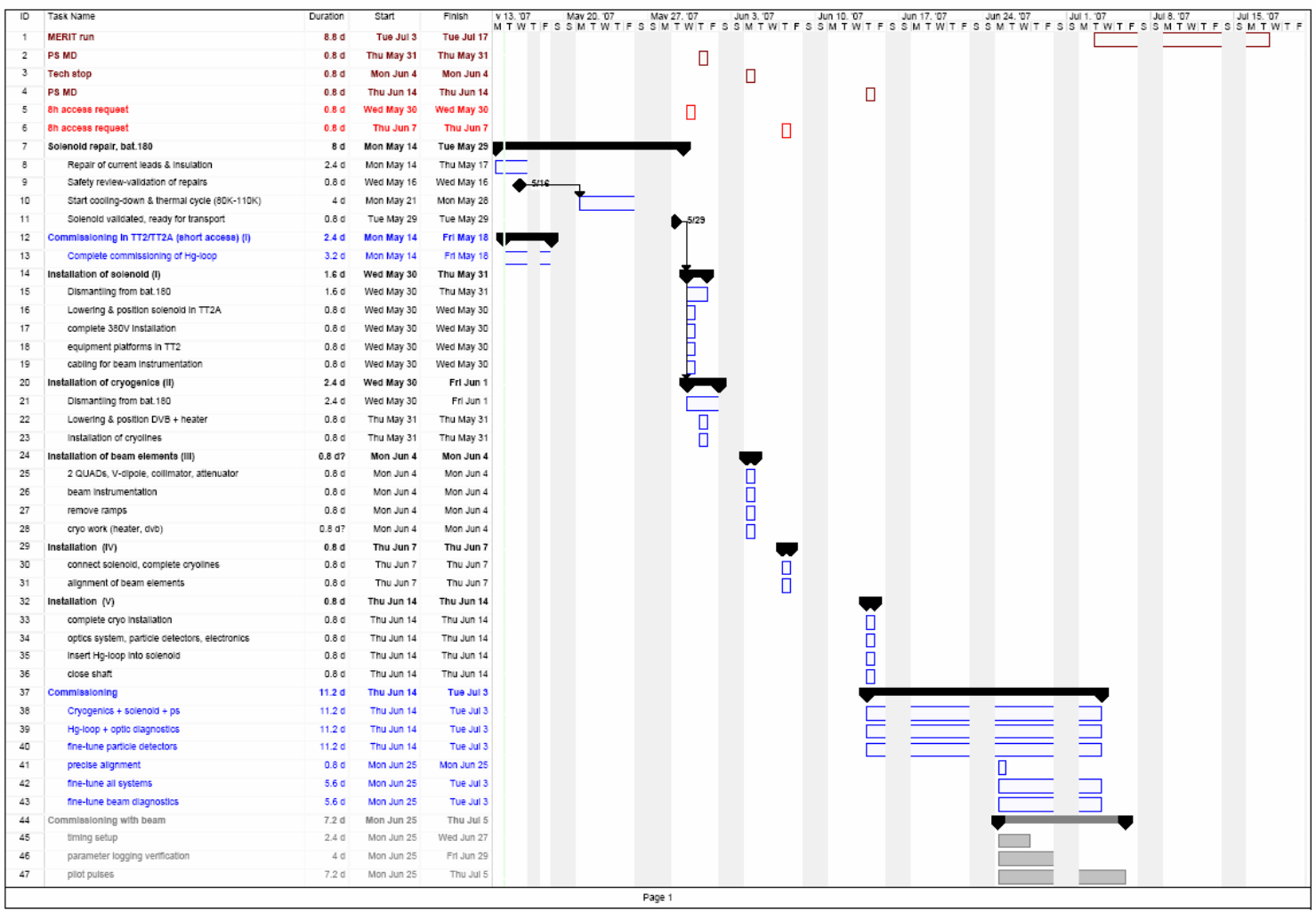


MERIT Experiment – Schedule

The 2007 CERN Accelerator Schedule



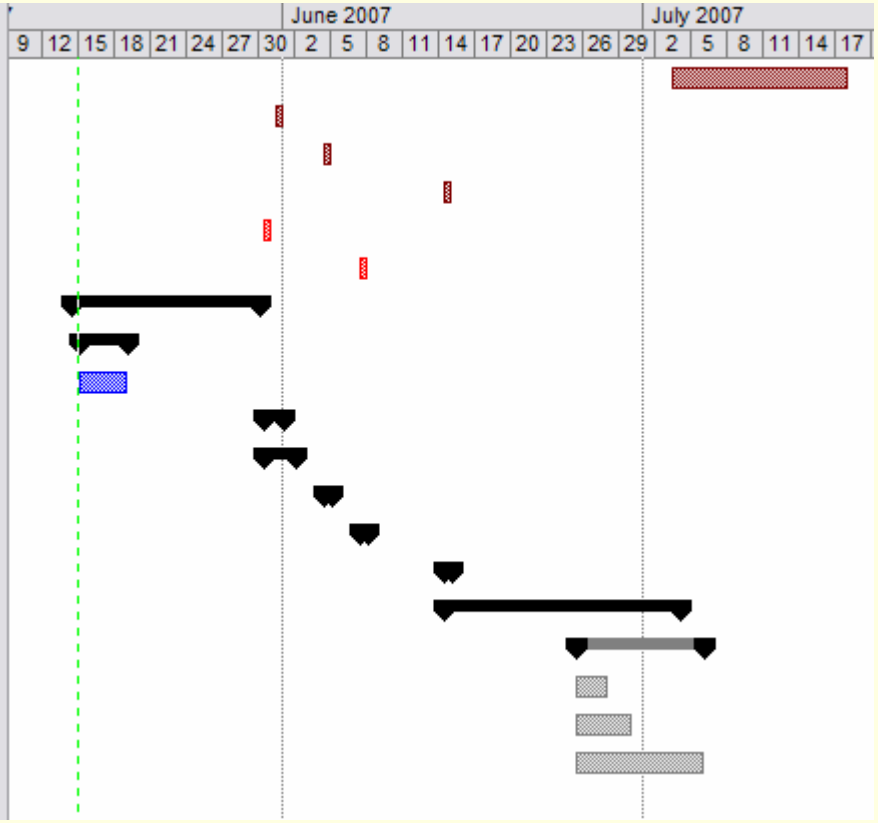
MERIT Experiment – Schedule (1)



ID	Task Name	Duration	Start	Finish
1	**MERIT run**	**8.8 d**	**Tue Jul 3**	**Tue Jul 17**
2	**PS MD**	**0.8 d**	**Thu May 31**	**Thu May 31**
3	**Tech stop**	**0.8 d**	**Mon Jun 4**	**Mon Jun 4**
4	**PS MD**	**0.8 d**	**Thu Jun 14**	**Thu Jun 14**
5	**8h access request**	**0.8 d**	**Wed May 30**	**Wed May 30**
6	**8h access request**	**0.8 d**	**Thu Jun 7**	**Thu Jun 7**
7	**Solenoid repair, bat.180**	**8 d**	**Mon May 14**	**Tue May 29**
8	Repair of current leads & insulation	2.4 d	Mon May 14	Thu May 17
9	Safety review-validation of repairs	0.8 d	Wed May 16	Wed May 16
10	Start cooling-down & thermal cycle (80K-110K)	4 d	Mon May 21	Mon May 28
11	Solenoid validated, ready for transport	0.8 d	Tue May 29	Tue May 29
12	**Commissioning in TT2/TT2A (short access) (I)**	**2.4 d**	**Mon May 14**	**Fri May 18**
13	Complete commissioning of Hg-loop	3.2 d	Mon May 14	Fri May 18
14	**Installation of solenoid (I)**	**1.6 d**	**Wed May 30**	**Thu May 31**
15	Dismantling from bat.180	1.6 d	Wed May 30	Thu May 31
16	Lowering & position solenoid in TT2A	0.8 d	Wed May 30	Wed May 30
17	complete 380V installation	0.8 d	Wed May 30	Wed May 30
18	equipment platforms in TT2	0.8 d	Wed May 30	Wed May 30
19	cabling for beam instrumentation	0.8 d	Wed May 30	Wed May 30
20	**Installation of cryogenics (II)**	**2.4 d**	**Wed May 30**	**Fri Jun 1**
21	Dismantling from bat.180	2.4 d	Wed May 30	Fri Jun 1
22	Lowering & position DVB + heater	0.8 d	Thu May 31	Thu May 31
23	Installation of cryolines	0.8 d	Thu May 31	Thu May 31
24	**Installation of beam elements (III)**	**0.8 d?**	**Mon Jun 4**	**Mon Jun 4**
25	2 QUADs, V-dipole, collimator, attenuator	0.8 d	Mon Jun 4	Mon Jun 4
26	beam instrumentation	0.8 d	Mon Jun 4	Mon Jun 4
27	remove ramps	0.8 d	Mon Jun 4	Mon Jun 4
28	cryo work (heater, dvb)	0.8 d?	Mon Jun 4	Mon Jun 4
29	**Installation (IV)**	**0.8 d**	**Thu Jun 7**	**Thu Jun 7**
30	connect solenoid, complete cryolines	0.8 d	Thu Jun 7	Thu Jun 7
31	alignment of beam elements	0.8 d	Thu Jun 7	Thu Jun 7
32	**Installation (V)**	**0.8 d**	**Thu Jun 14**	**Thu Jun 14**
33	complete cryo installation	0.8 d	Thu Jun 14	Thu Jun 14
34	optics system, particle detectors, electronics	0.8 d	Thu Jun 14	Thu Jun 14
35	insert Hg-loop into solenoid	0.8 d	Thu Jun 14	Thu Jun 14
36	close shaft	0.8 d	Thu Jun 14	Thu Jun 14
37	**Commissioning**	**11.2 d**	**Thu Jun 14**	**Tue Jul 3**
38	Cryogenics + solenoid + ps	11.2 d	Thu Jun 14	Tue Jul 3
39	Hg-loop + optic diagnostics	11.2 d	Thu Jun 14	Tue Jul 3
40	fine-tune particle detectors	11.2 d	Thu Jun 14	Tue Jul 3
41	precise alignment	0.8 d	Mon Jun 25	Mon Jun 25
42	fine-tune all systems	5.6 d	Mon Jun 25	Tue Jul 3
43	fine-tune beam diagnostics	5.6 d	Mon Jun 25	Tue Jul 3
44	Commissioning with beam	7.2 d	Mon Jun 25	Thu Jul 5
45	timing setup	2.4 d	Mon Jun 25	Wed Jun 27
46	parameter logging verification	4 d	Mon Jun 25	Fri Jun 29
47	pilot pulses	7.2 d	Mon Jun 25	Thu Jul 5

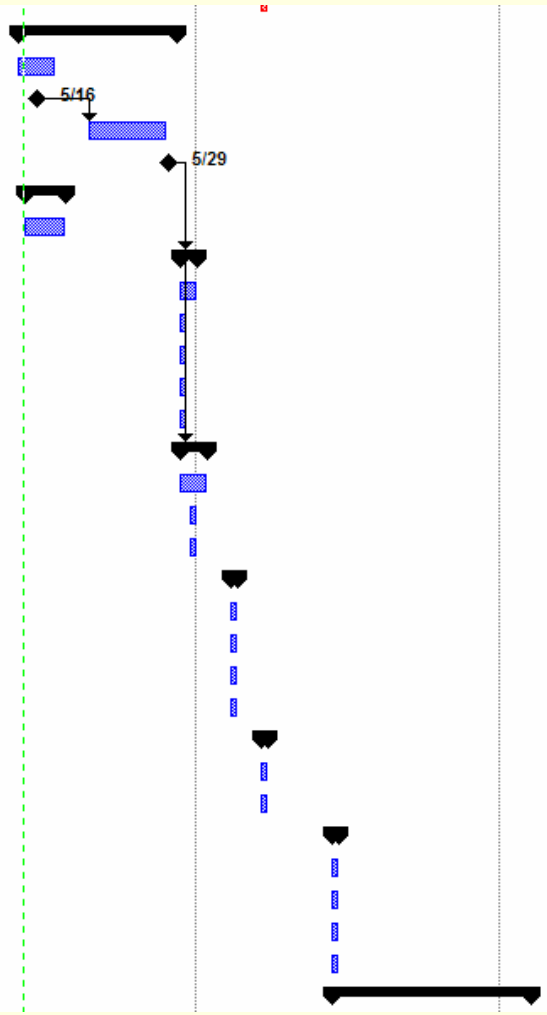
MERIT Experiment – Schedule (2)

Task Name	Start	Finish
MERIT run	Tue Jul 3	Tue Jul 17
PS MD	Thu May 31	Thu May 31
Tech stop	Mon Jun 4	Mon Jun 4
PS MD	Thu Jun 14	Thu Jun 14
8h access request	Wed May 30	Wed May 30
8h access request	Thu Jun 7	Thu Jun 7
+ Solenoid repair, bat.180	Mon May 14	Tue May 29
− Commissioning in TT2/TT2A (short access) (I)	Mon May 14	Fri May 18
Complete commissioning of Hg-loop	Mon May 14	Fri May 18
+ Installation of solenoid (I)	Wed May 30	Thu May 31
+ Installation of cryogenics (II)	Wed May 30	Fri Jun 1
+ Installation of beam elements (III)	Mon Jun 4	Mon Jun 4
+ Installation (IV)	Thu Jun 7	Thu Jun 7
+ Installation (V)	Thu Jun 14	Thu Jun 14
+ Commissioning	Thu Jun 14	Tue Jul 3
− Commissioning with beam	Mon Jun 25	Thu Jul 5
timing setup	Mon Jun 25	Wed Jun 27
parameter logging verification	Mon Jun 25	Fri Jun 29
pilot pulses	Mon Jun 25	Thu Jul 5



MERIT Experiment – Schedule (3)

7	– **Solenoid repair, bat.180**	**Mon May 14**	**Tue May 29**
8	Repair of current leads & insulation	Mon May 14	Thu May 17
9	Safety review-validation of repairs	Wed May 16	Wed May 16
10	Start cooling-down & thermal cycle (80K-110K)	Mon May 21	Mon May 28
11	Solenoid validated, ready for transport	Tue May 29	Tue May 29
12	– **Commissioning in TT2/TT2A (short access) (I)**	**Mon May 14**	**Fri May 18**
13	Complete commissioning of Hg-loop	Mon May 14	Fri May 18
14	– **Installation of solenoid (I)**	**Wed May 30**	**Thu May 31**
15	Dismantling from bat.180	Wed May 30	Thu May 31
16	Lowering & position solenoid in TT2A	Wed May 30	Wed May 30
17	complete 380V installation	Wed May 30	Wed May 30
18	equipment platforms in TT2	Wed May 30	Wed May 30
19	cabling for beam instrumentation	Wed May 30	Wed May 30
20	– **Installation of cryogenics (II)**	**Wed May 30**	**Fri Jun 1**
21	Dismantling from bat.180	Wed May 30	Fri Jun 1
22	Lowering & position DVB + heater	Thu May 31	Thu May 31
23	Installation of cryolines	Thu May 31	Thu May 31
24	– **Installation of beam elements (III)**	**Mon Jun 4**	**Mon Jun 4**
25	2 QUADs, V-dipole, collimator, attenuator	Mon Jun 4	Mon Jun 4
26	beam instrumentation	Mon Jun 4	Mon Jun 4
27	remove ramps	Mon Jun 4	Mon Jun 4
28	cryo work (heater, dvb)	Mon Jun 4	Mon Jun 4
29	– **Installation (IV)**	**Thu Jun 7**	**Thu Jun 7**
30	connect solenoid, complete cryolines	Thu Jun 7	Thu Jun 7
31	alignment of beam elements	Thu Jun 7	Thu Jun 7
32	– **Installation (V)**	**Thu Jun 14**	**Thu Jun 14**
33	complete cryo installation	Thu Jun 14	Thu Jun 14
34	optics system, particle detectors, electronics	Thu Jun 14	Thu Jun 14
35	insert Hg-loop into solenoid	Thu Jun 14	Thu Jun 14
36	close shaft	Thu Jun 14	Thu Jun 14
37	– **Commissioning**	**Thu Jun 14**	**Tue Jul 3**



Summary (1)

- Installation scheduled delayed by ~1.5months due to the problems with the cryostat
  - Repairs underway – solution found remains to be validated by SC and surface tests (build.180)
  - Lowering of material to TT2/TT2A is expected to start on week-22
- A schedule has been prepared which assumes 5×8h access for “heavy” installation during working hours
  - three are scheduled during PS MD times on weeks 22-24 ; two are proposed – to be validated by ABOC
  - short accesses upon request are assumed to complete the installation
- The schedule IS VERY tight and requires lot of co-activity in the tunnels
  - All safety measures will be taken….
- The best compensation to everybody’s efforts will be a successful running with good results by the end of July (?)

Summary (2)

- MERIT @ CERN is a combined effort of many colleagues
  - **AB**: ABP, ATB, CO, PO, OP, BI, SU
  - **AT**: MEL, VAC, ECR
  - **TS**: EL, IC, CE, CSE
  - **SC**: GS, RP
- Many thanks for their efforts and support so far, and…

  Even more thanks for the anticipated efforts due to the tight schedule!

Backup slides

The MERIT experiment

*A **proof-of-principle test of a target station** suitable for a Neutrino Factory or Muon Collider source using a 24-GeV proton beam incident on a target consisting of a **free mercury jet** that is inside a **15-T capture solenoid magnet**.*

Proposal submitted to INTC – May 2004

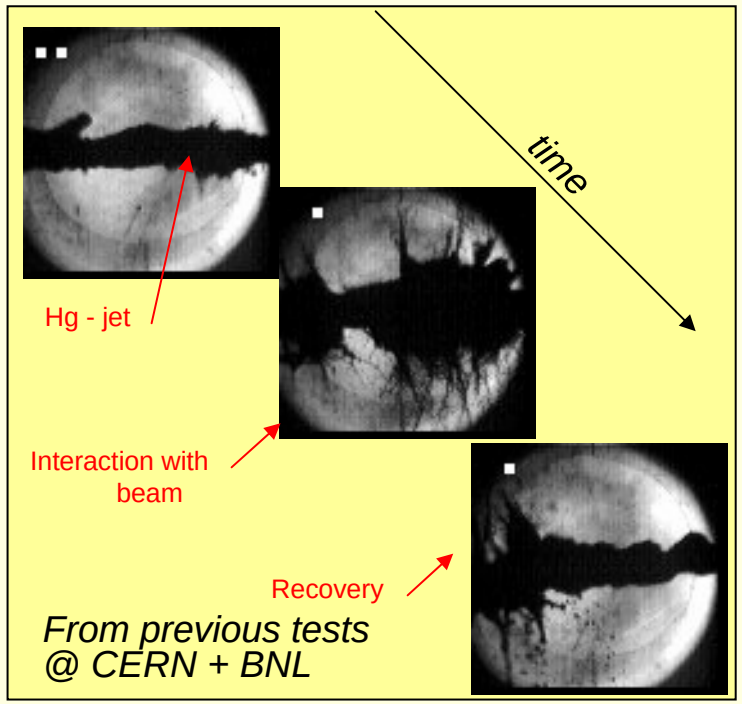
Experiment approved as **nTOF11**

Participating Institutes

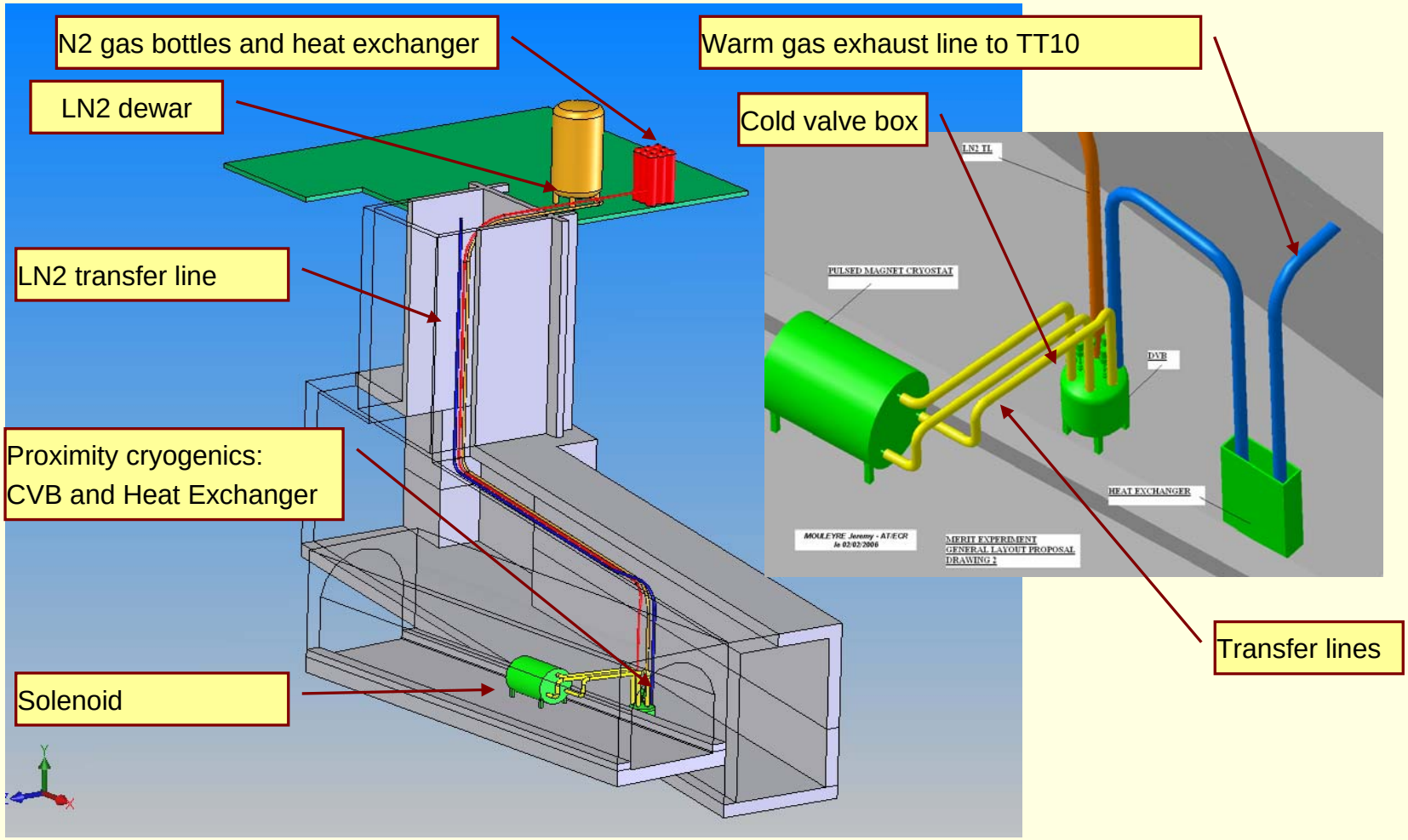
- BNL, MIT, ORNL, Princeton University
- KEK
- CERN, RAL

Spokespersons

- H. Kirk (BNL), K. McDonald (Princeton Univ.)



Cryogenics – Layout



Cryogenics – Surface tests

- Process control implemented
- Remote operation from control room tested
- Interlock with solenoid power supply defined

- Installation in build.180 for surface tests completed
  - System fully commissioned with dummy load