# MEG: search for $\mu$ - er with a 10<sup>-13</sup> sensitivity

A. M. Baldini (INFN Pisa) for the **MEG collaboration** 





Andrzej J. Buras & Cecilia Tarantino Technical University Munich

 Mirror Leptons can enhance LFV by 25-30 orders of magnitude e.g. Br (μ→eγ)<sub>LHT</sub> ~ 10<sup>-(12±2)</sup>
 could be tested by MEG(2007) A "significant" result before any LHC discovery

Publish in 2008 the "significant" result



# Full data taking in 2007



# Start data taking in 2006 to fully test the whole experiment

Presented last year

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# Detector Installation 2006: run in december



Drift Chambers (8 out of 16)



#### Timing Counters (bars, not fibers)



#### Stopping Target

Gas Control System (Cobra+DC)

N2 Bag





# **Commissioning Run Provisional Results**

#### Data still under Analysis **PROVISIONAL**

Must correct for material in front of measuring device

Rate at Entrance COBRA 1.15·10<sup>8</sup>  $\mu$ +s<sup>-1</sup> at 1.8mA, 4cm TgRate at COBRA centre > 6 ·10<sup>7</sup>  $\mu$ +s<sup>-1</sup> at 1.8mA, 4cm Tg (under investigation)Beam Spot  $\sigma \sim 10.8$  mm (as expected)



entering COBRA

# Trigger, DAQ, Logging and Central MIDAS

Trigger 36 Type 1 boards 5 Type 2 boards 4 Ancillary boards all cabling Firmware version 0
DAQ DRS chips + cables for: DC: 864 channels

TC: 60 channels

NaJ: 9 channels

#### **Logging and Central MIDAS**

data taking with all channels of installed sub-detector components

installed

and

operational

(except for dc trigger)

- 2 weeks of data taking at the end of december
- 285 runs taken at different beam intensities and HV settings
- in total ~600 GB recorded





#### TC: waveforms: 2 digitizers



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### Timing Counter: first results

#### Run 236 High Intensity (6 107 muons/s stopping in target)



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#### DRS charge vs Trigger WFM Charge



#### MEG status report

### DCH: waveforms; DRS @ 500 MHz



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# Timing



Positrons spiralling in the chambers and hitting the TCs

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### DCH: first results; Hit rate / wire



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### DCH: Anode Asymmetry

MC: Use z-coordinate

Data : Use Anode asymmetry

$$A = \frac{Q_{\rm u} - Q_{\rm d}}{Q_{\rm u} + Q_{\rm d}}$$



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Rate in different counters as a function of beam intensity

Set to 100% the maximum intensity, scale the rest accordingly



### LXe calorimeter construction status



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### Cryostat delay 1: cold vessel deformation (oct. 2006)



# Cold vessel re-machining

- The welded thin window was removed for this procedure
- Scraped away the inner wall by 5mm at maximum
- PMT support successfully installed
- Checked with a gap gauge of 200 µm with the supporting structure installed on 22/Jan/2007





# Cryostat delay 2: Honeycomb Panel - Brief Retrospect

- The 1<sup>st</sup> panel broke down in pressure test in June 2006
- New (2<sup>nd</sup>) panel was designed
  - − Honeycomb thickness 19mm → 26.5mm
  - High module prepreg 0.75mm→ 1mm
  - Transition with fabric only → Taper Transition
  - Also this one broke on Aug. 21° 2006 in pressure tests



Thin window welded on the cold vessel



1<sup>st</sup> honeycomb panel pressure test







# The 3<sup>rd</sup> Panel

- Internal reinforcement at the edges.
- Fiber with lower module but with a better Elongation (T300, used in aerospace applications with over 20 year service history).
  - 1.5mm prepreg thickness with 8 piles (1mm in the 2<sup>nd</sup> panel
- Space-approved Resin epoxy (Hysol EA9361)



## Construction Status of the 3rd Panel

- Project + Construction = 6 months
- Delivery to Pisa in this week
- Pressure and low temperature test next week : crucial test





Inner skin



# **Updated Construction Schedule**

	Task Name	Duration	Start	Finish	Pre Decem	ber 12/10 12/17 12/24	January 12/31 01/07 01/14 01/21	February	March 02/25 03/04 03/11 03/18 03/29	April 5 04/01 04/08
1	Test vuoto	8 days	Mon 06/12/04	Thu 06/12/14		<u> </u>		and a second sec	Terre la construction de la constru	
2	Check INFN	0 days	Thu 06/12/14	Thu 06/12/14	1	12/14				
3	Test pressione e vuoto	5 days	Fri 06/12/15	Thu 06/12/21	2	ring and a second se				
4	INFN check	0 days	Thu 06/12/21	Thu 06/12/21	3	12/21				
5	Smontaggio finestra sottile	2 days	Fri 06/12/22	Tue 07/01/02	4	+				
6	Lavorazione camera fredda	10 days	Wed 07/01/03	Tue 07/01/16	5		The second secon			
7	INFN Check	0 days	Tue 07/01/16	Tue 07/01/16	6		01/16			
8	Costruzione nuova finestra sottile	5 days	Wed 07/01/17	Tue 07/01/23	7		<b></b>			
9	INFN Check	0 days	Tue 07/01/23	Tue 07/01/23	8		<b>*</b> 0	1/23		
10	Istallazione struttura supporto PMT	4 days	Wed 07/01/24	Mon 07/01/29	9		<b>*</b>			
11	INFN Check	0 days	Mon 07/01/29	Mon 07/01/29	10			<b>01/29</b>		
12	Installazione nuovo HC	5 days	Tue 07/01/30	Mon 07/02/05	11			<b></b>		
13	Saldatura nuova finestra sottile	3 days	Tue 07/02/06	Thu 07/02/08	12			i i i i i i i i i i i i i i i i i i i		
14	Test fuga saldatura finestra sottile	1 day	Fri 07/02/09	Fri 07/02/09	13			i i i i i i i i i i i i i i i i i i i		
15	Controllo dimensionale	1 day	Mon 07/02/12	Mon 07/02/12	14			T <sub>1</sub>		
16	Check INFN	0 days	Mon 07/02/12	Mon 07/02/12	15			02/12		
17	Montaggio fasce	1 day	Tue 07/02/13	Tue 07/02/13	16	∫ Now: s	superinsulati	on 📑		
18	Installazione superinsulation	5 days	Wed 07/02/14	Tue 07/02/20	17	l in	stallation	time to the second seco		
19	INFN Check	0 days	Tue 07/02/20	Tue 07/02/20	18			<b>↔</b> 02	2/20	
20	Assemblaggio camere	8 days	Wed 07/02/21	Fri 07/03/02	19			<b>*</b>		
21	Check INFN	0 days	Fri 07/03/02	Fri 07/03/02	20	Acco	mbling the	cold	03/02	
22	Saldatura soffietti	3 days	Mon 07/03/05	Wed 07/03/07	21	71336	mbing me	colu	To the second se	
23	Test elio saldature soffietti	1 day	Thu 07/03/08	Thu 07/03/08	22	chambe	r inside the	e warm	- Alexandre	
24	Lucidatura interno camera fredda	2 days	Fri 07/03/09	Mon 07/03/12	23		looning (F y	unalka)	i i i i i i i i i i i i i i i i i i i	
25	Pulizia camera fredda	3 days	Tue 07/03/13	Thu 07/03/15	24	one + c	leaning (5 v	veeksj	i i i i i i i i i i i i i i i i i i i	
26	INFN check	0 days	Thu 07/03/15	Thu 07/03/15	25				<b>€</b> 03/15	
27	Assiemaggio e integrazione finale	5 days	Fri 07/03/16	Thu 07/03/22	26				i i i i i i i i i i i i i i i i i i i	
28	Preparazione test criogenico	3 days	Fri 07/03/23	Tue 07/03/27	27 Einol	Cruca	nie Teet /	2 wooko)	Č T	
29	Test criogenico	5 days	Wed 07/03/28	Tue 07/04/03		cryoge	mc rest (	z weeks)	ľ.	<u> </u>
30	Test fuga camera fredda dopo ciotest	5 days	Wed 07/04/04	Tue 07/04/10	29					i imi
31	Imballaggio e trasporto	2 days	Wed 07/04/11	Thu 07/04/12	30					i ii

Shipping to PSI

# **Xenon Storage**

- ~900L in liquid, largest amount of LXe ever liquefied in the world
- Very stable
  - Pressure raise 0.003MPa/h w/o cooling
  - 0.111 MPa → 0.2 MPa in 44 hours







# **Machine Status**

original Completion Date:
 ~ mid-May 2007

• NEW Completion Date: ~ end-February & expected Ready for testing mid-April ~ 2007





# **Cockcroft-Walton Area**



#### Tasks & Problems

DC gas leakage build / rebuild the chambers track reconstruction code still missing

Ready in mid-June

#### TC

fiber detectors (APD electronics) & laser system redesign & build N2 bags further tests/calibration at Frascatti matching with DC tracks

#### LXe

honeycomb window ready this week - pressure test ryostat delivery C-W will arrive earlier! - testing mid-April in mid-April

### Trigger/DAQ

data rate limited at 5Hz (full detector) - toward 100Hz? DRS3 probably not for 2007

### Computing

data size reduction (9MB/event)

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Other (possible) users at the earliest possible time...

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# Conclusions

## **Background and Sensitivity**



Gamma Energy (%) Gamma Timing Gamma Position (mm) Gamma Efficiency (%) e+ Timing (nsec) e+ Momentum (%) e+ Angle (mrad) e+ Efficiency (%) Muon Decay Point (mm) Muon Rate (10<sup>8</sup>/sec) Running Time (10<sup>7</sup>sec) Accidental Rate (10<sup>-14</sup>) # Accidental Events 90% CL Limit (10<sup>-13</sup>)



Updated number should be available after Physics Meeting in Tokyo, March 29-30

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#### MEG status report

