FAX COVER PAGE

CALIFORNIA INSTITUTE OF TECHNOLOGY

LIGO Project, 102-33 East Bridge Laboratory, Pasadena, California 91125
818-395-2129, Fax 818-304-9834

TO:	FRANKLIN, SIBLEY, STAPFER
ORGANIZATION:	
FAX NUMBER:	504 686-7189
VOICE NUMBER:	
DATE:	6/26/97
TIME:	

FROM:	L. JONES
ORGANIZATION:	
FAX NUMBER:	
VOICE NUMBER:	
REFER TO:	LIGO-G970182-00-B
SUBJECT:	RAI'S VIEWGRAPHS FOR 10:30 CCB/TRB MEETING

NUMBER OF PAGES FAXED INCLUDING THIS COVER SHEET:	5

BEAM TUBE VACUUM TESTS

- **Prior estimates for leak signature size and outgassing are in error by a factor of 2 to 4**
  Unanticipated gain fluctuations experienced in the RGA electron multiplier
  Temperature fluctuations in the outgassing not properly accounted for.
- **Assay by accumulation in the beam tube**
  "snapshots" to maintain RGA sensitivity with frequent local calibrations
  Technique reduces systematic errors introduced by T variations
  Reduces calibration errors from variations in diffusion time with amu
  Measurements at the level equivalent to UHV (10^{-12} to 10^{-9} torr)
- **Current best estimates**
  $1 \times 10^{-7} < Q(\text{air signature equiv leak}) < 4 \times 10^{-7}$ torr liters/sec
  $J(H_2, 296K) < 1 \times 10^{-13}$ torr liters/sec cm^2

  Internal consistency of the amu results with the local and global calibrations

- **To do to guide a decision on the acceptance of the tube**
  Establish the gas model
  Measure (trustworthy) calibration gas cracking patterns
  Needed to establish N_2 and CO contributions to amu 28 signal
  Make an accumulation with the gas discharge gauges off
  Needed to reduce confusion in the gas model (NO?)
  Establish the "in field" sensitivity of the air signature method

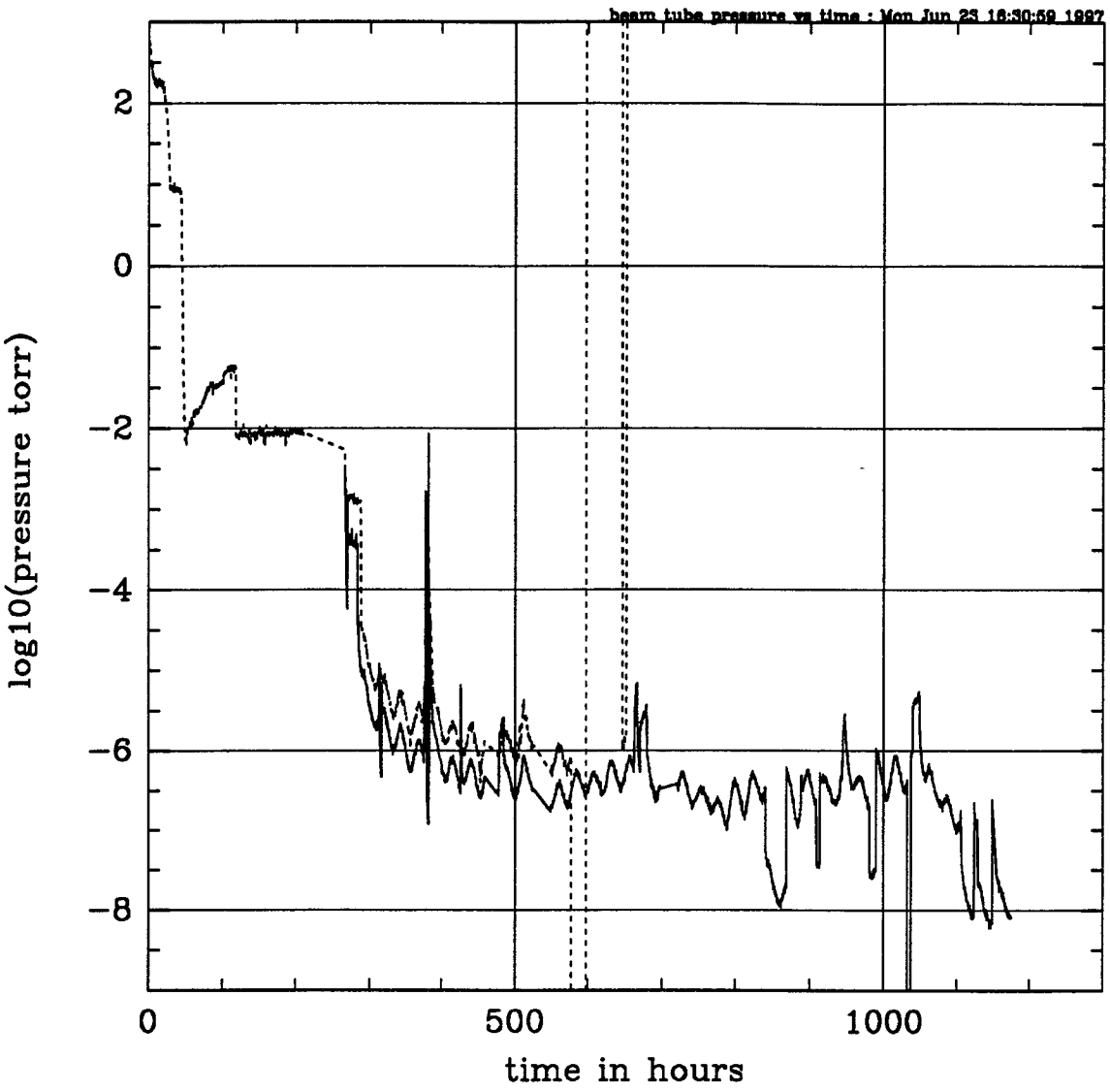
- **To think about for the future**
  Methods of establishing the VITON outgassing
  estimate 1 to 3 x 10^{-7} torr liters/sec from PSI data
  measure 1/t dependence of the air signature in other beamtube modules

  Effective means to clean up the B pump port hardware and the RGA's
  need to make the system gain stable

  Suggestions to improve the "in field" procedures:
  local/global calibration,
  concurrent low (Faraday) and high sensitivity(ion counter) RGA's

Table 1: Gas load units of 10^{-8} torr liters/sec

	amu	06/18/97	06/19/97	06/20/97
H_2	2	749.4(19.5)	790.7(32.4)	**1235.5(13.5)**
CO,CO_2 CH_4	12	4.29(0.11)	3.88(0.23)	5.26(0.13)
N_2	14	**14.1(0.12)**	**9.44(0.49)**	**25.9(0.58)**
CH_4,N_2	15	3.08(0.05)	3.33(0.19)	5.94(0.12)
CH_4 ,O_2	16	9.89(0.14)	8.02(0.53)	10.3(0.34)
H_2O	18	0.31(0.007)	0.61(0.34)	0.52(0.11)
N_2	27	0.50(0.019)	0.41(0.042)	0.64(0.038)
N_2 ,CO	28	**116.1(3.59)**	**73.4(2.89)**	**189.1(4.41)**
N_2	29	0.89(0.03)	0.71(0.04)	1.20(0.05)
NO(?)	30	41.0(0.773)	43.4(2.10)	61.8(0.69)
O_2	32	**11.29(0.23)**	**4.83(0.22)**	5.01(0.13)
A	40	**0.367(0.009)**	**0.217(0.017)**	0.224(0.016)
CO_2	44	35.46(0.51)	31.9(1.94)	28.8(1.83)
H_2 torr/cps	2	$1.08x10^{-13}$	$1.60x10^{-13}$	$1.54x10^{-13}$
N_2 torr/cps	28	$1.20x10^{-13}$	$1.40x10^{-13}$	$3.53x10^{-13}$
avg T C		26.0	24.9	25.7
T cor to 23C	2	0.76	0.84	0.78
T cor to 23C	all others	0.71	0.81	0.73
Cal Air Lk	14	**4.96(1.2)**		
Cal Air Lk	28	**38.2(7.7)**		
Cal Air Lk	32	**6.15(1.5)**		
Cal Air Lk	40	**0.15(0.04)**		
H_2 Lk	2			**410**
N_2 Lk	14			**14.3**
N_2 Lk	28			**110**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log10(pressure torr)
2
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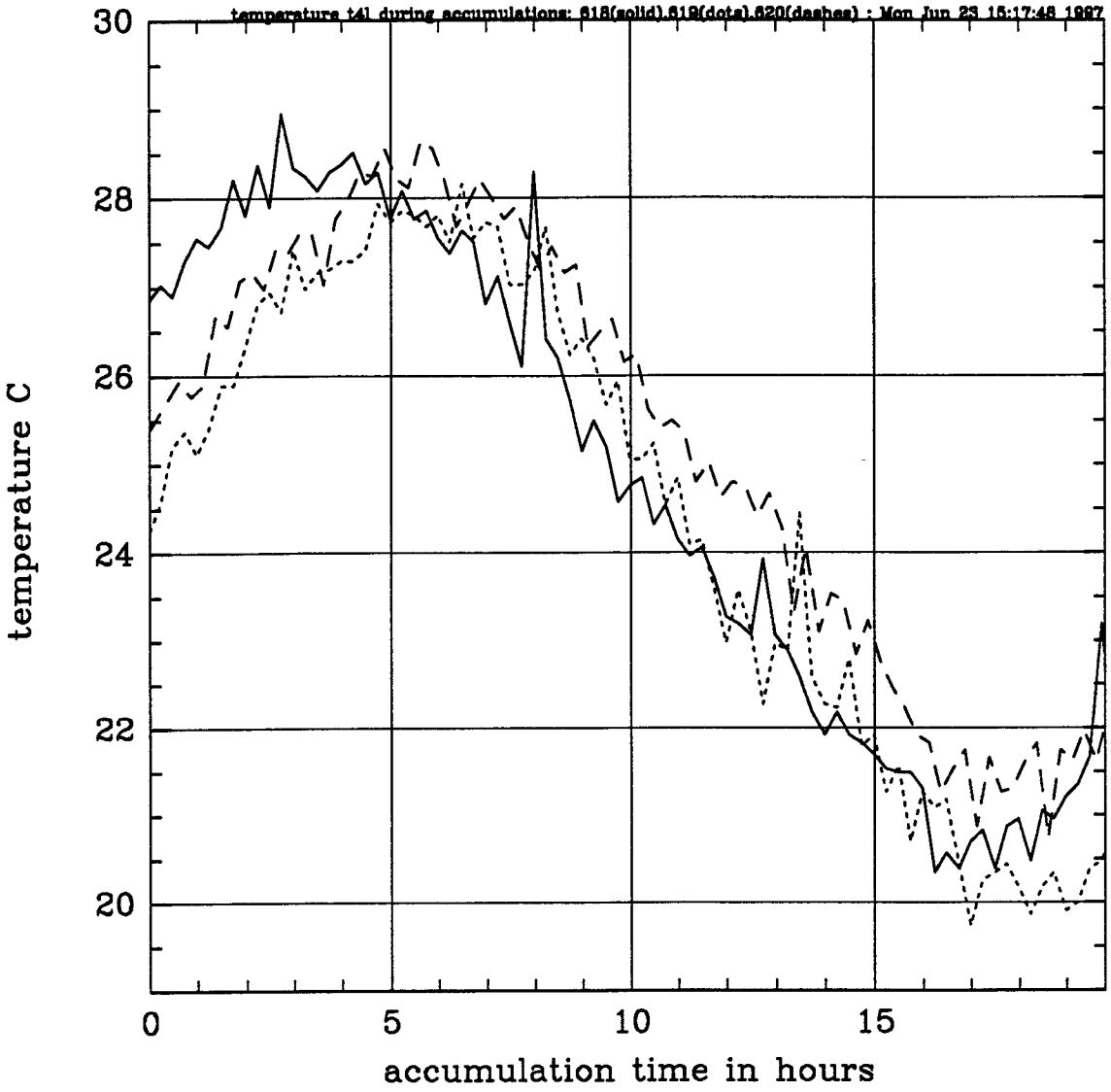
-2
-4
-6
-8
0
500
1000
time in hours


temperature t4l during accumulations: 618(solid),619(dots),620(dashes) : Mon Jun 23 15:17:48 1997
30
28
26
24
22
20
temperature C
0
5
10
15
accumulation time in hours

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SUBJECT:	

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VIEWGRAPH'S FOR RAI'S PREVIEW OF X2 ACCEPTANCE TEST DATA (10:30 CCB)

BEAM TUBE VACUUM TESTS

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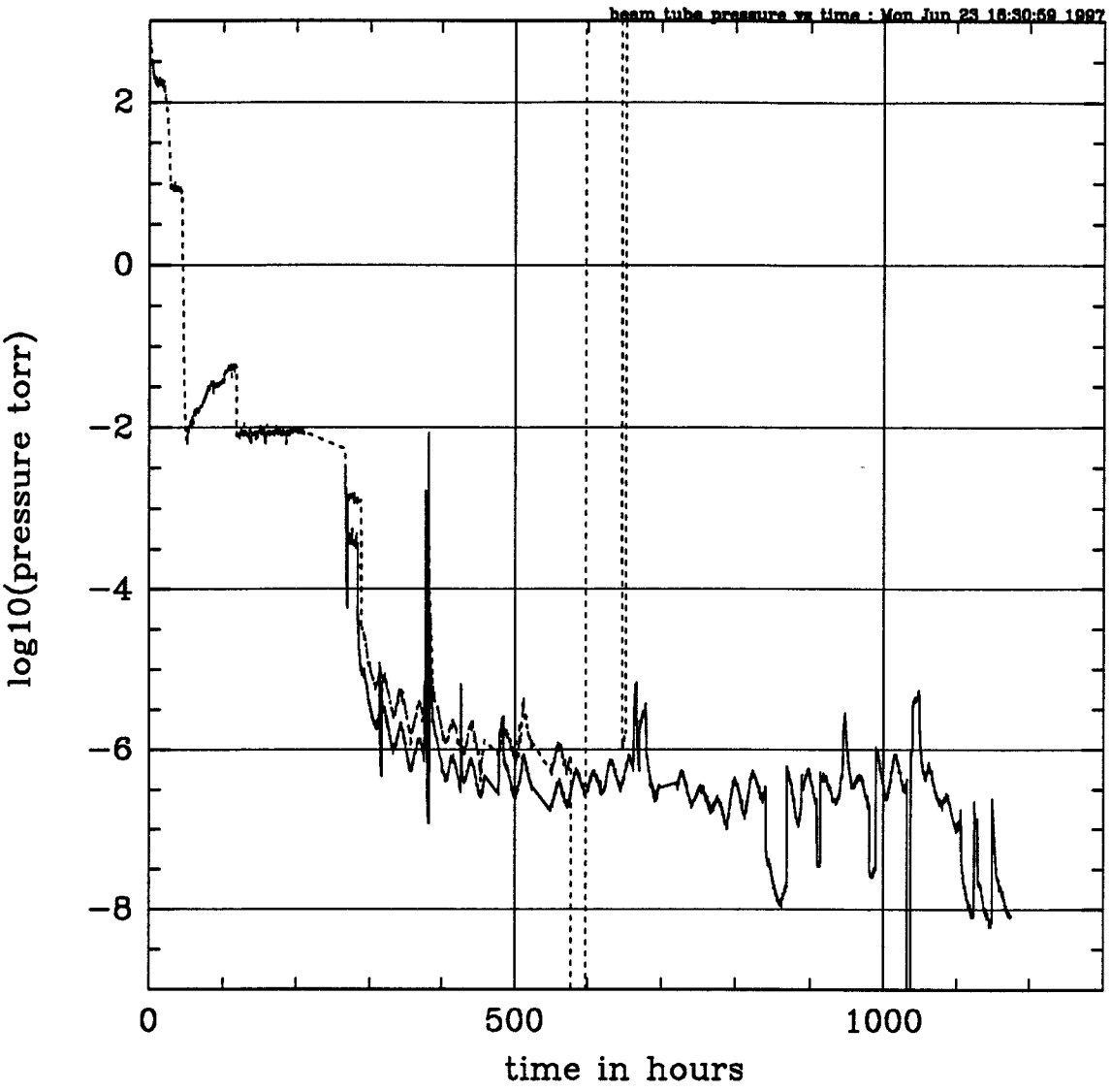
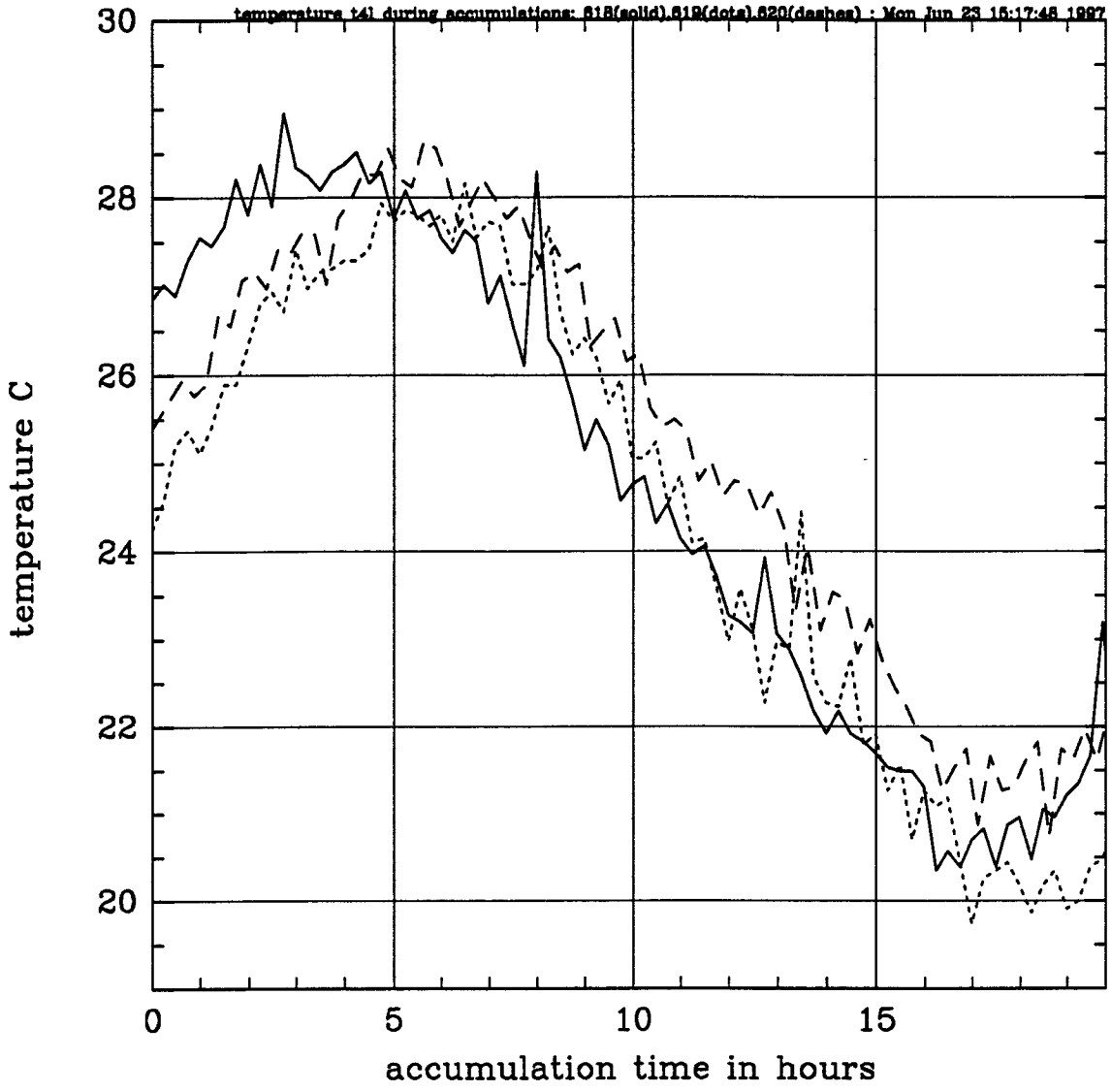

beam tube pressure vs time : Mon Jun 23 16:30:59 1997
log10(pressure torr)
2
0
−2
−4
−6
−8
0
500
1000
time in hours


temperature t4l during accumulations: 618(solid),619(dots),620(dashes) : Mon Jun 23 15:17:48 1997
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TO:	SHOEMAKER & ZUCKER
ORGANIZATION:	
FAX NUMBER:	617 253-7014
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DATE:	6/26/97
TIME:	

FROM:	L. JONES
ORGANIZATION:	
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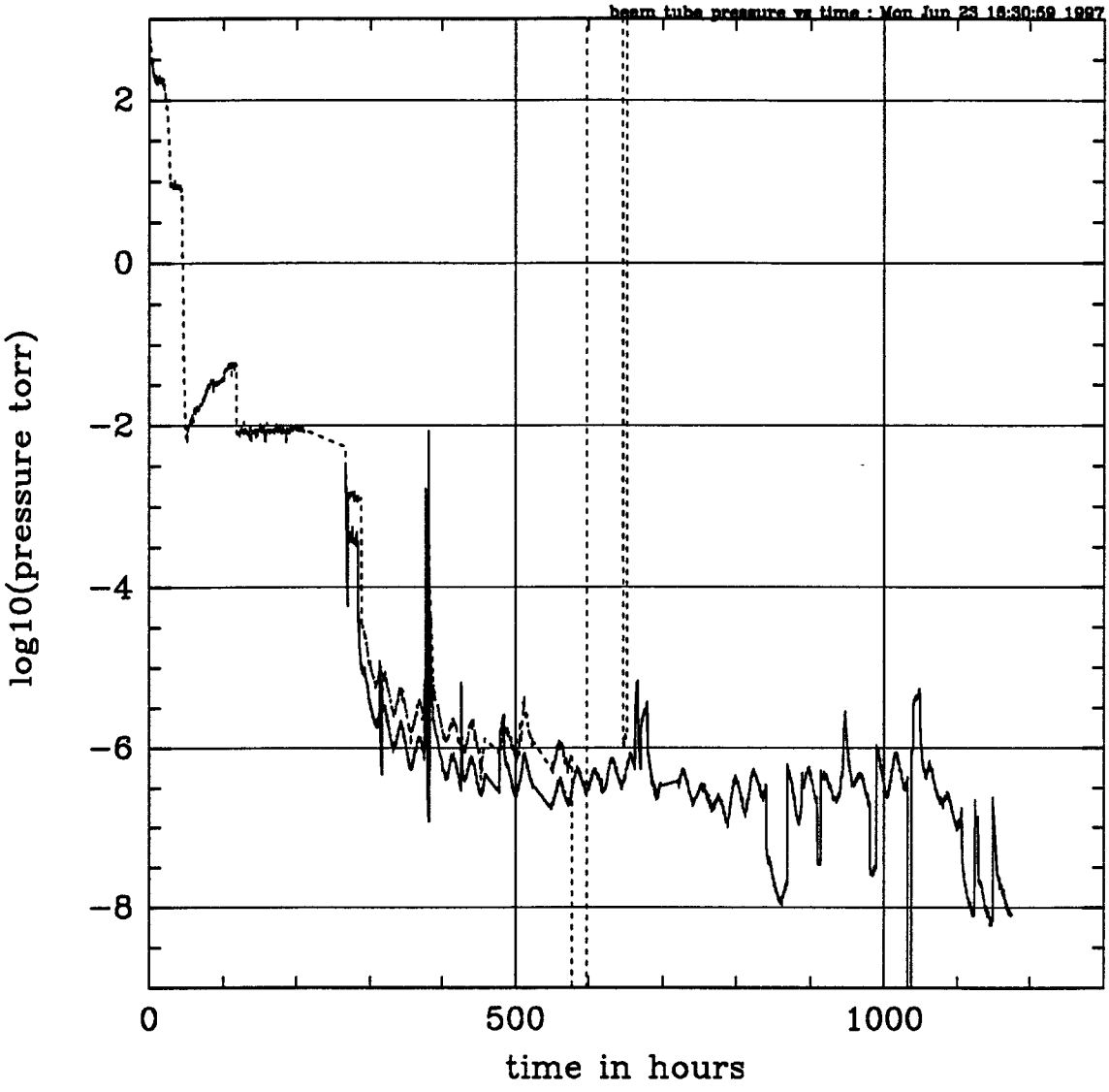
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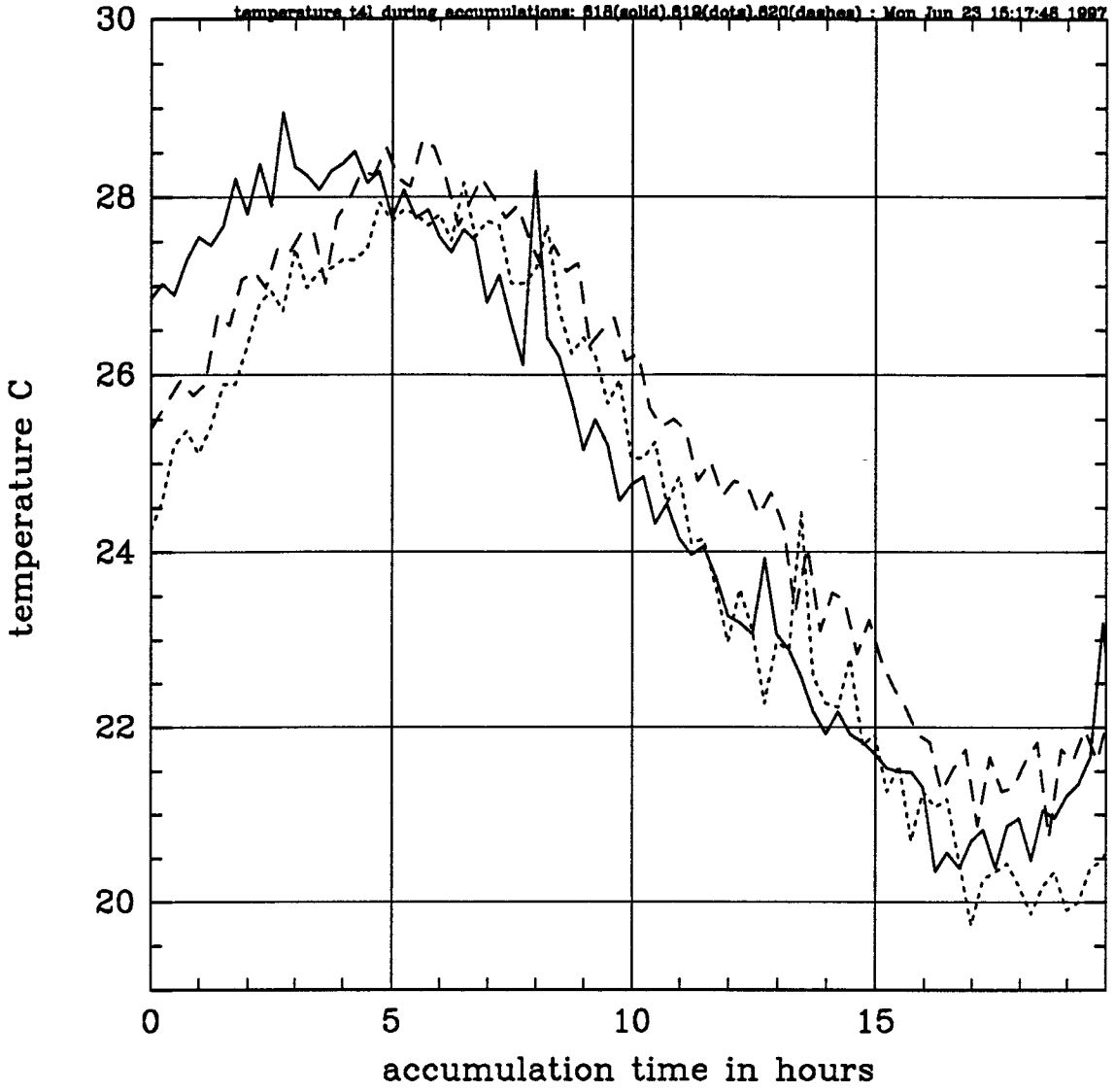
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