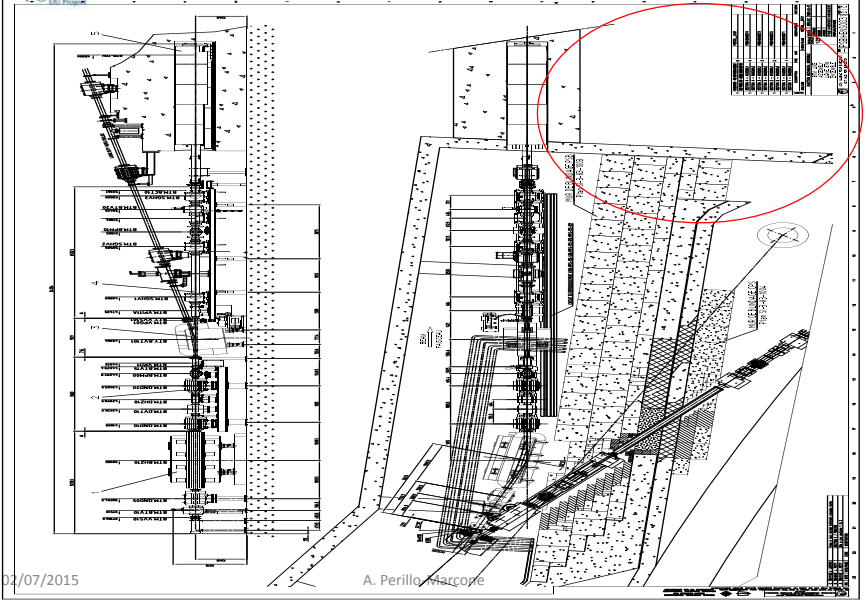
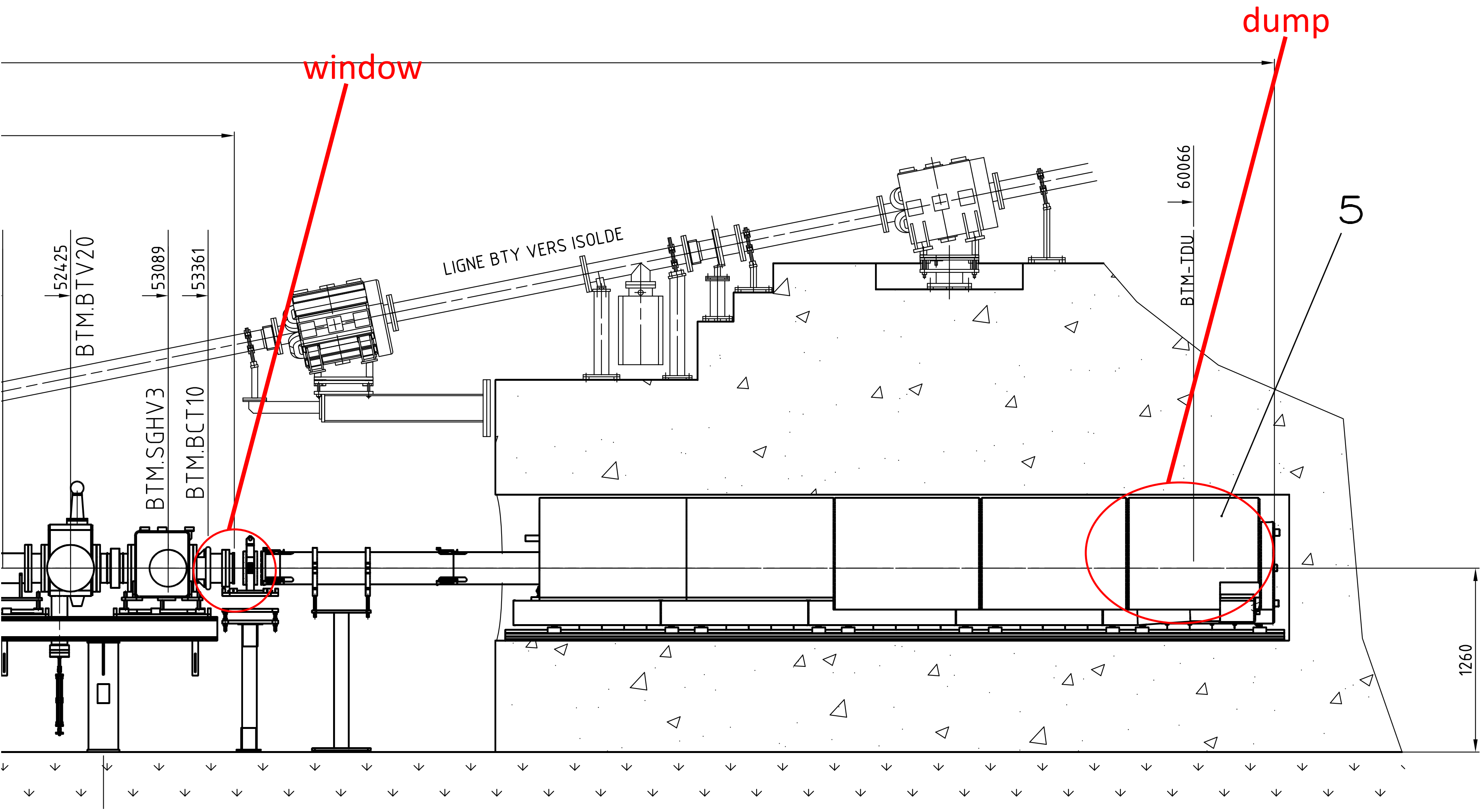
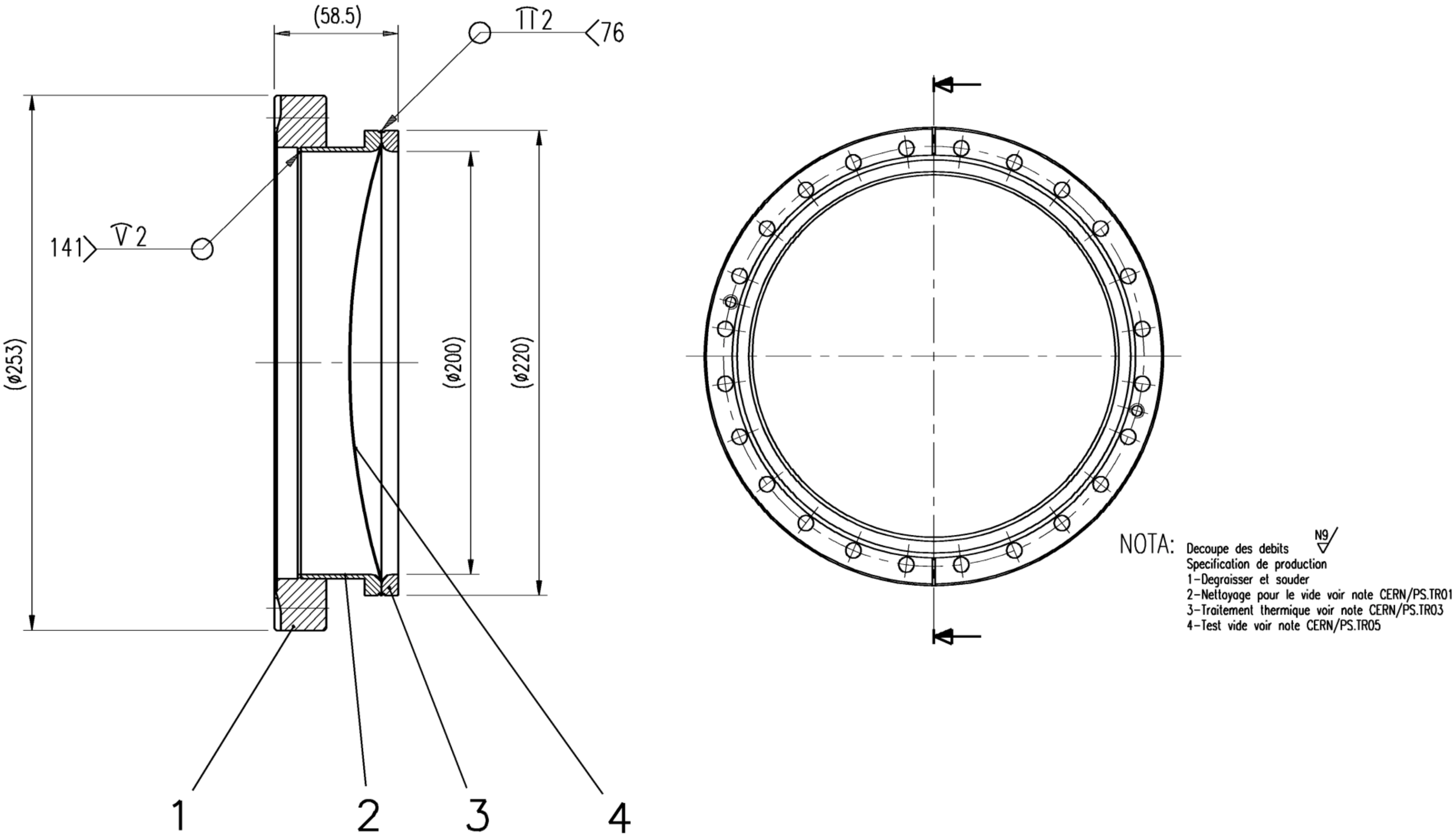
PSB Dump and Vacuum Window



PSB Dump and Vacuum Window

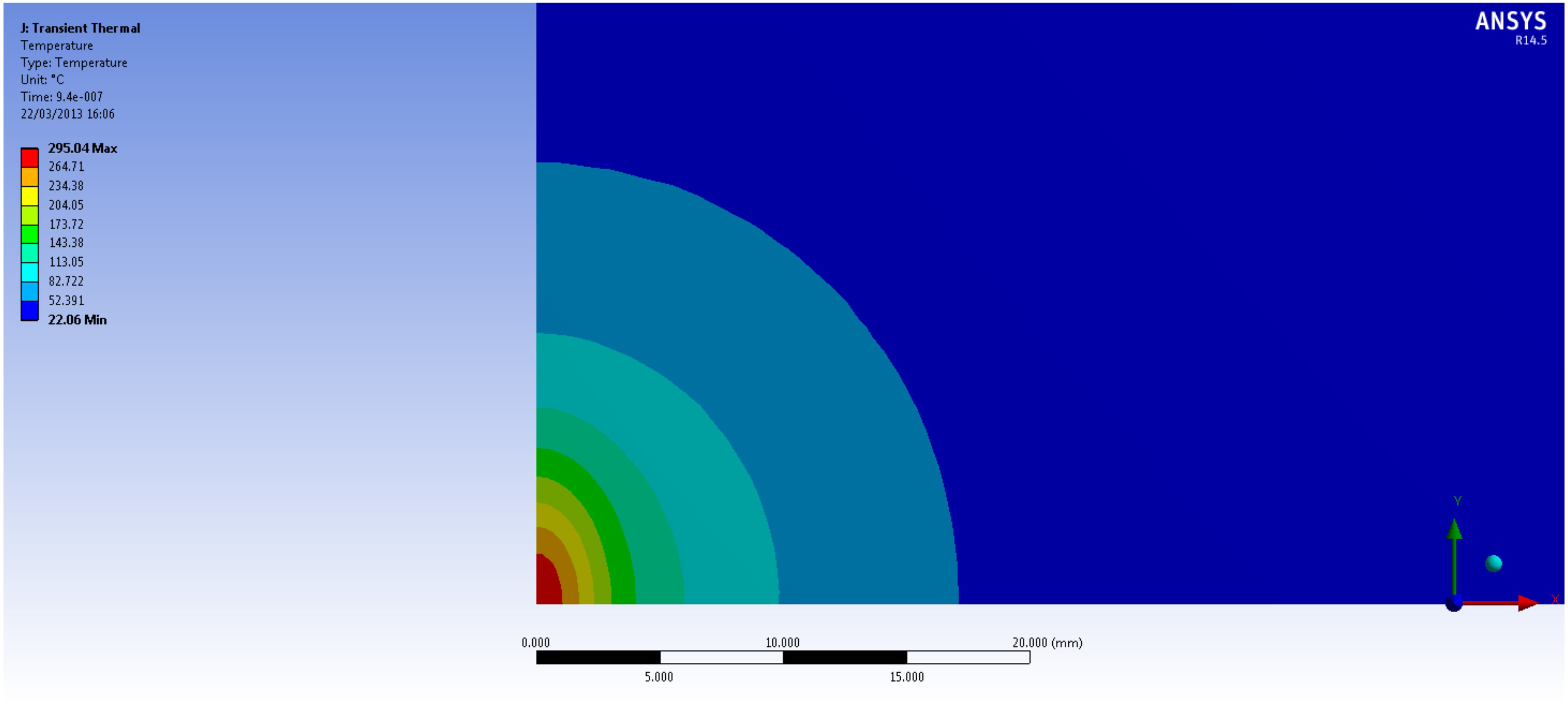


Current Vacuum Window



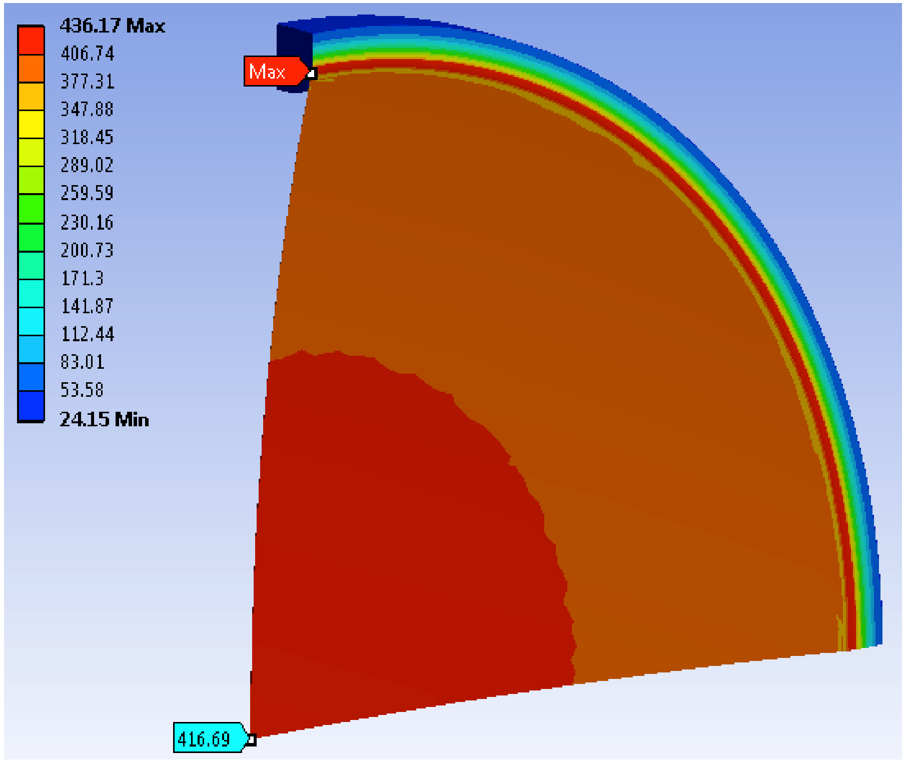
NOTA: Decoupe des debits
Specification de production
1–Degraisser et souder
2–Nettoyage pour le vide voir note CERN/PS.TR01
3–Traitement thermique voir note CERN/PS.TR03
4–Test vide voir note CERN/PS.TR05

FEA of Current Window (2GeV – 1e14 p/p)



Max temperature near 300C after

FEA of Current Window (2GeV – 1e14 p/p)



Max stress = 436 MPa

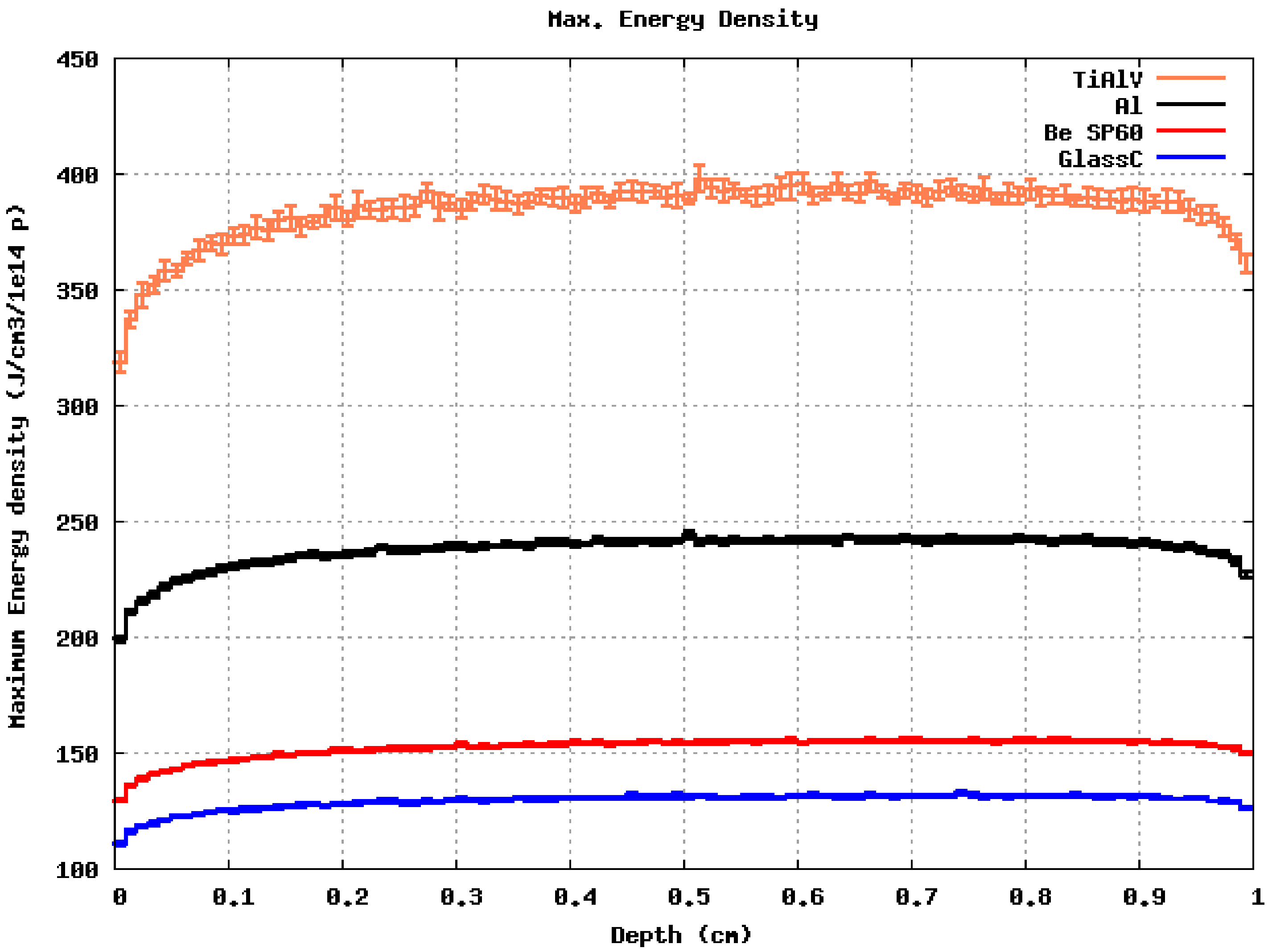
Conclusion:

Current window not adapted to beam energy and intensities expected after LS2

New Window
Different options being studied

- Beryllium (1.85 g/cm^3)
- Aluminium (2.7 g/cm^3)
- Titanium alloy Ti-6Al-4V (4.4 g/cm^3)
- Glassy Carbon (1.4 g/cm^3)

New Window
Energy density deposited by beam



DT (^{o}C)
after one pulse

90 (Ti6Al4V)

103 (Al)

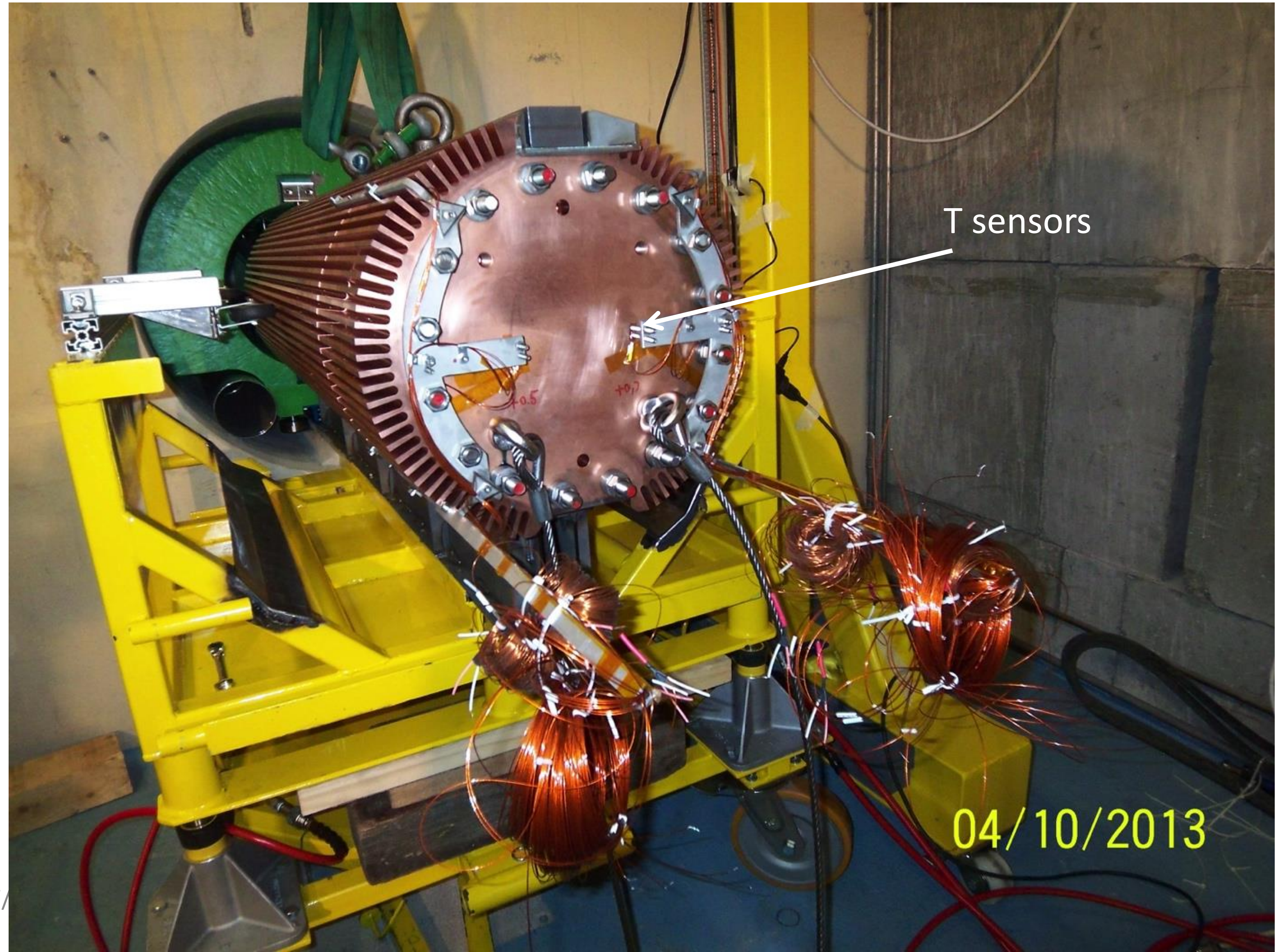
44 (Be)

114 (C)

New Window
Next steps

- Thermo-mechanical simulations (temperatures, stresses) EN/STI
- Design proposal (materials, thicknesses) EN/STI
- RP validation DGS/RP
- Detailed design TE/VSC – support from EN/STI and EN/MME
- Manufacture TE/VSC
- Installation TE/VSC

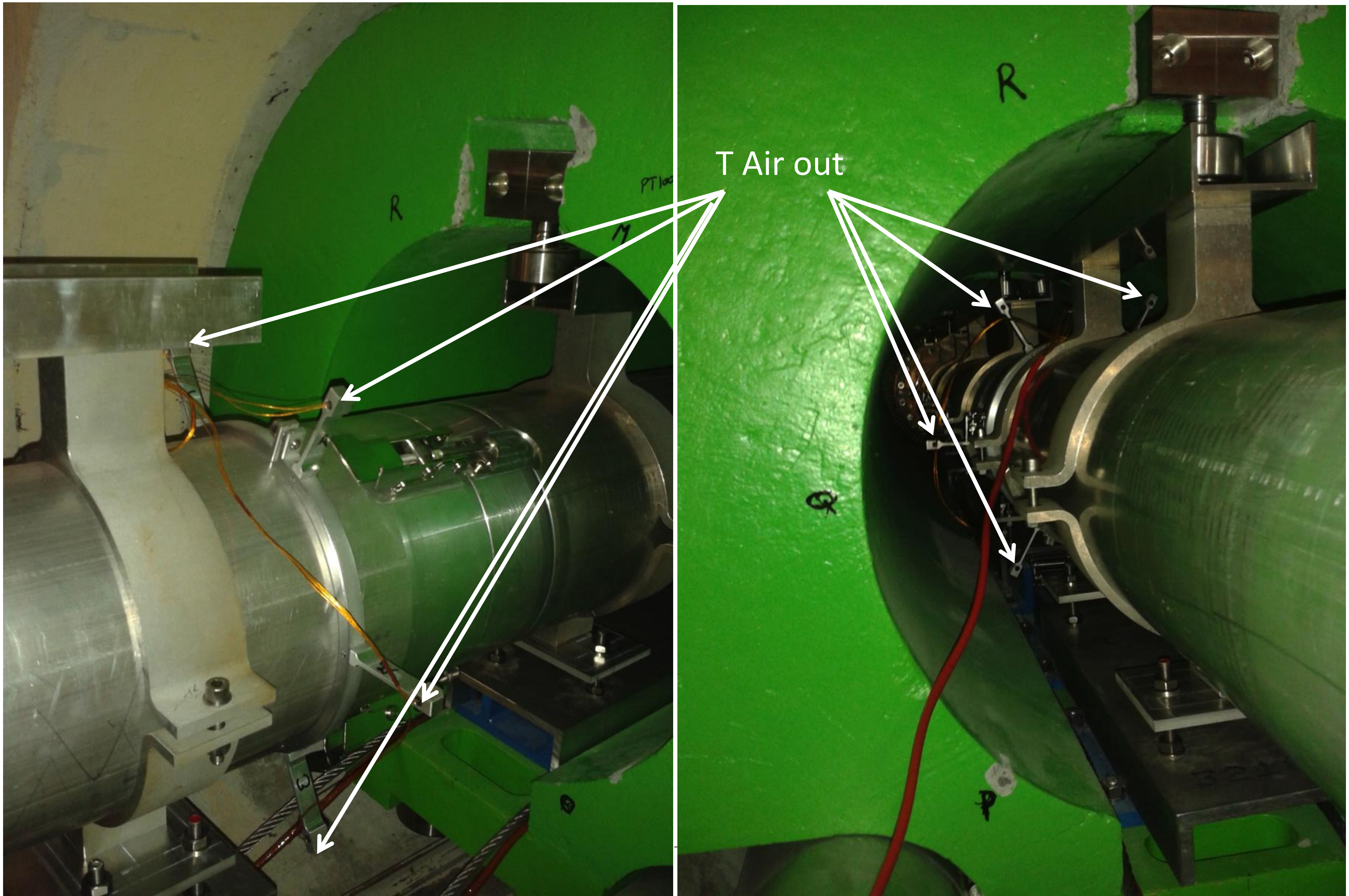
PSB Dump
Current Performance



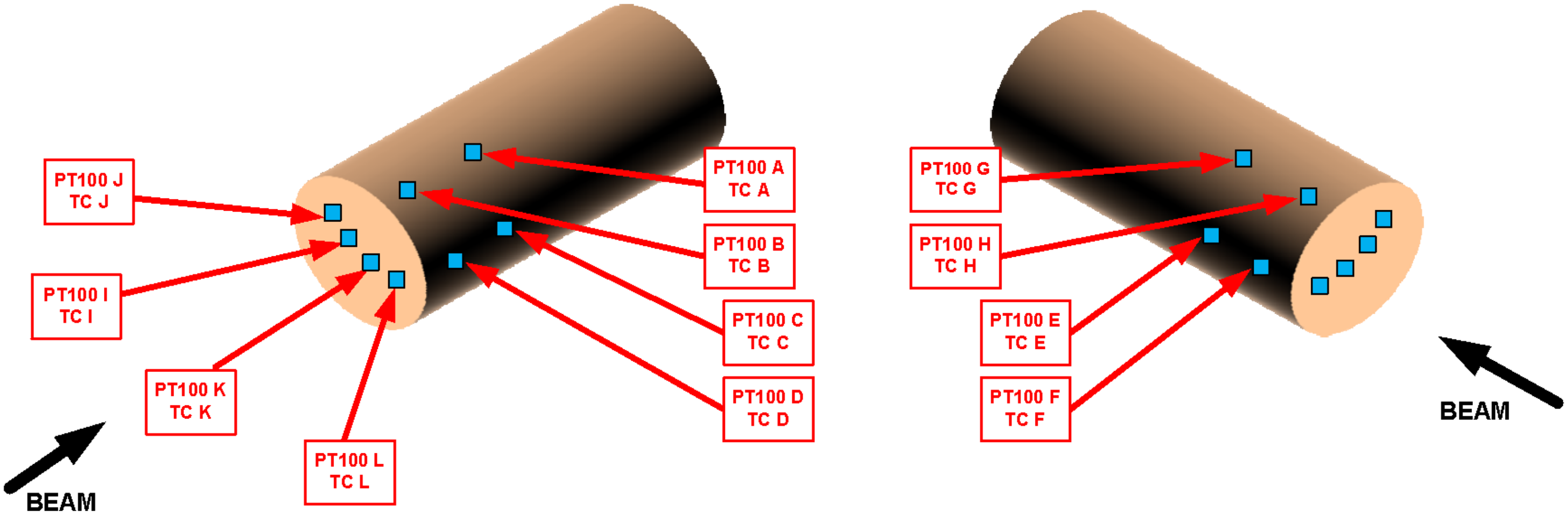
T sensors

04/10/2013

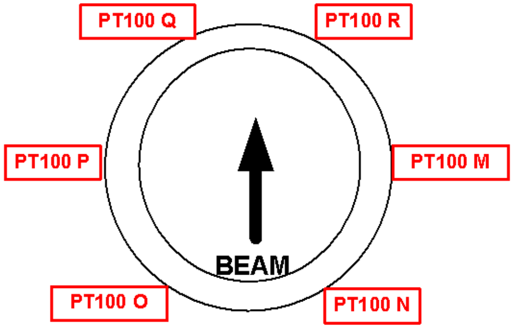
PSB Dump
Current Performance



PSB Dump
Current Performance

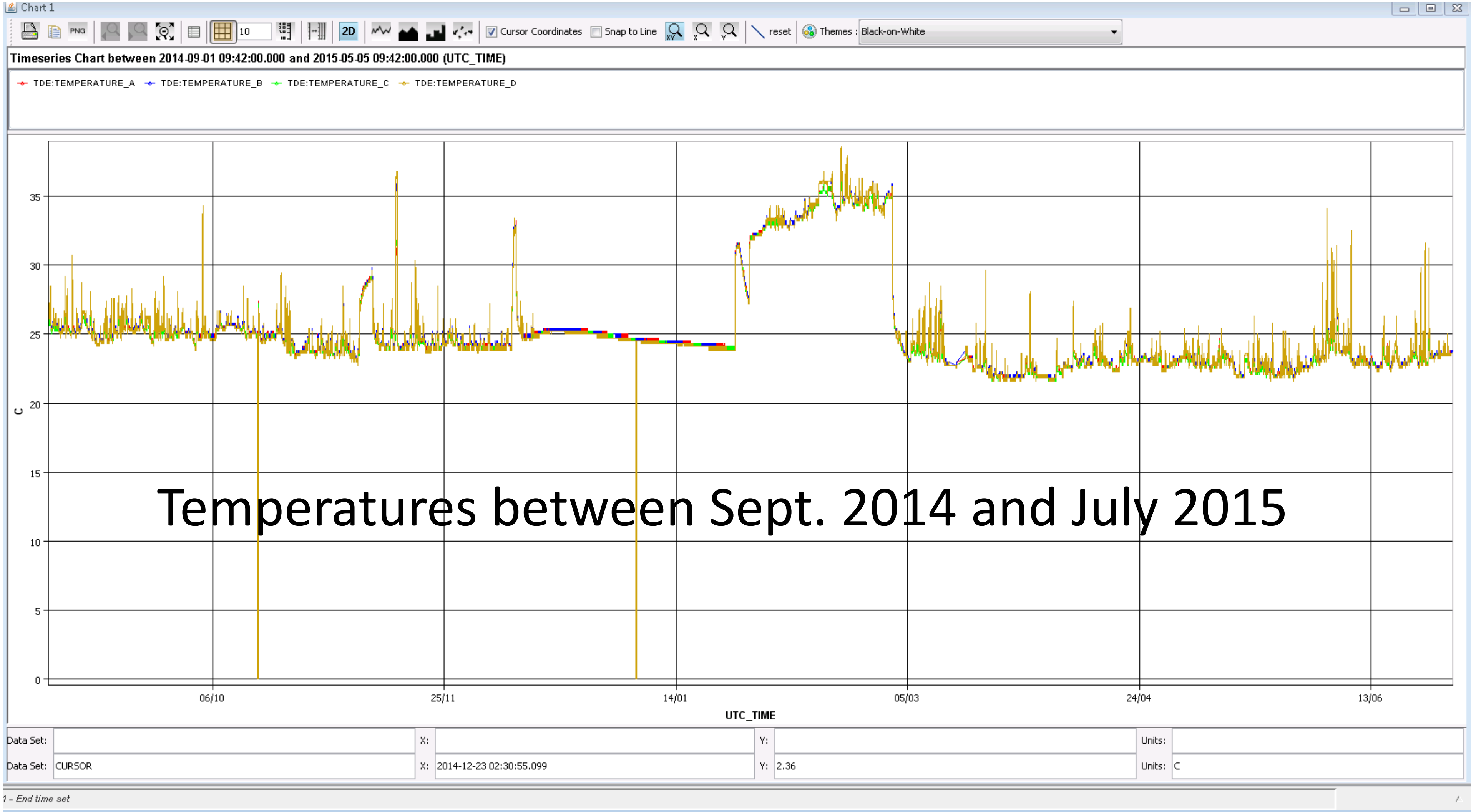


AIR Temperature



J. Lendaro

PSB Dump
Current Performance



Timeseries Chart between 2014-09-01 09:42:00.000 and 2015-05-05 09:42:00.000 (UTC_TIME)

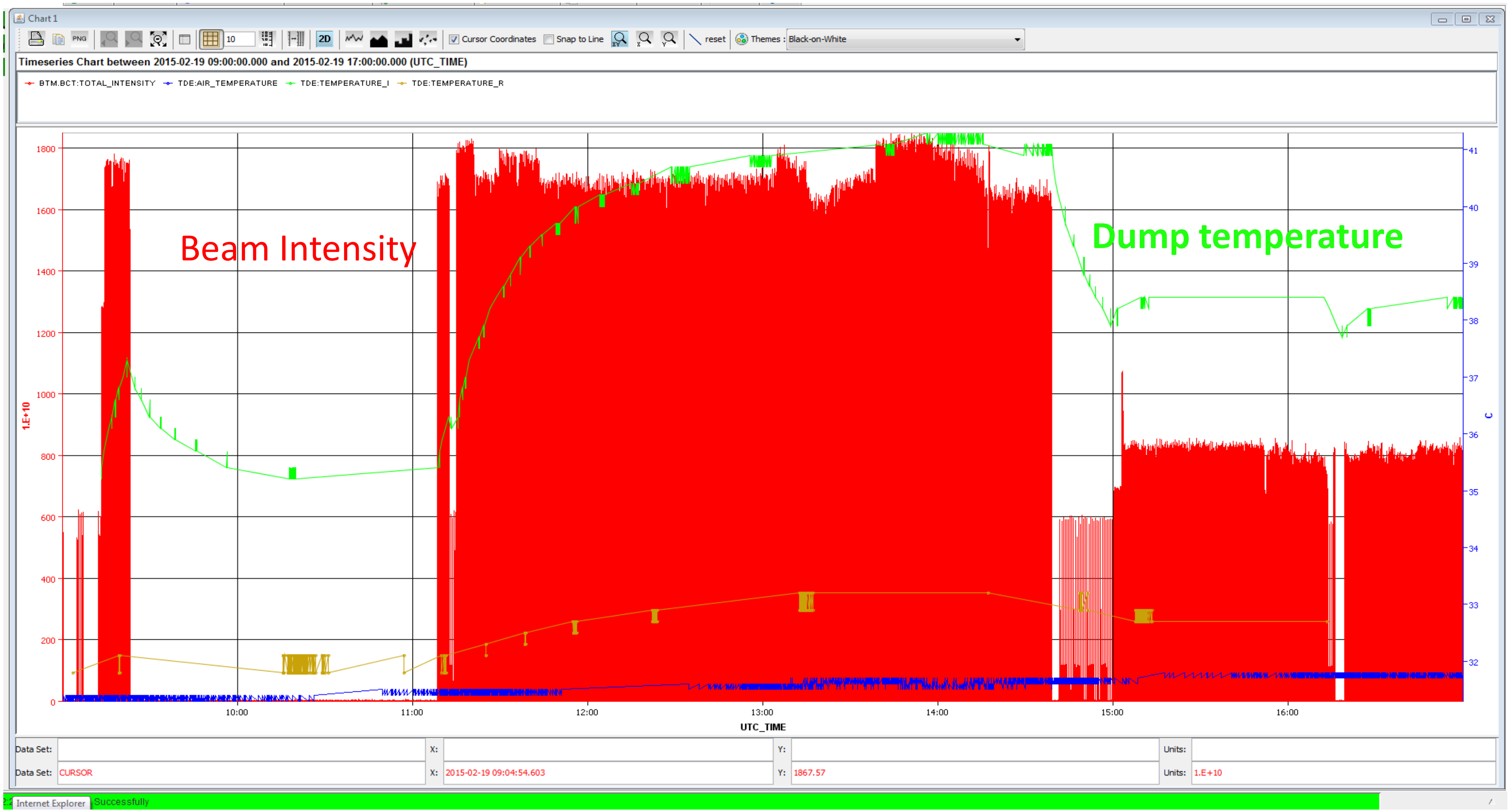
Data Set: X: Y: Units:

Data Set: CURSOR X: 2014-12-23 02:30:55.099 Y: 2.36 Units: C

1 - *End time set*

Temperatures between Sept. 2014 and July 2015

PSB Dump
Current Performance



Themes : Black-on-White

Timeseries Chart between 2015-02-19 09:00:00.000 and 2015-02-19 17:00:00.000 (UTC_TIME)

Beam Intensity

Dump temperature

Data Set: X: Y: Units:

Data Set: CURSOR X: 2015-02-19 09:04:54.603 Y: 1867.57 Units: 1.E+10

PSB Dump
Current Performance

Comparison PT100s in February

Some of them in June measured temperatures lower than zero or higher than 300°C

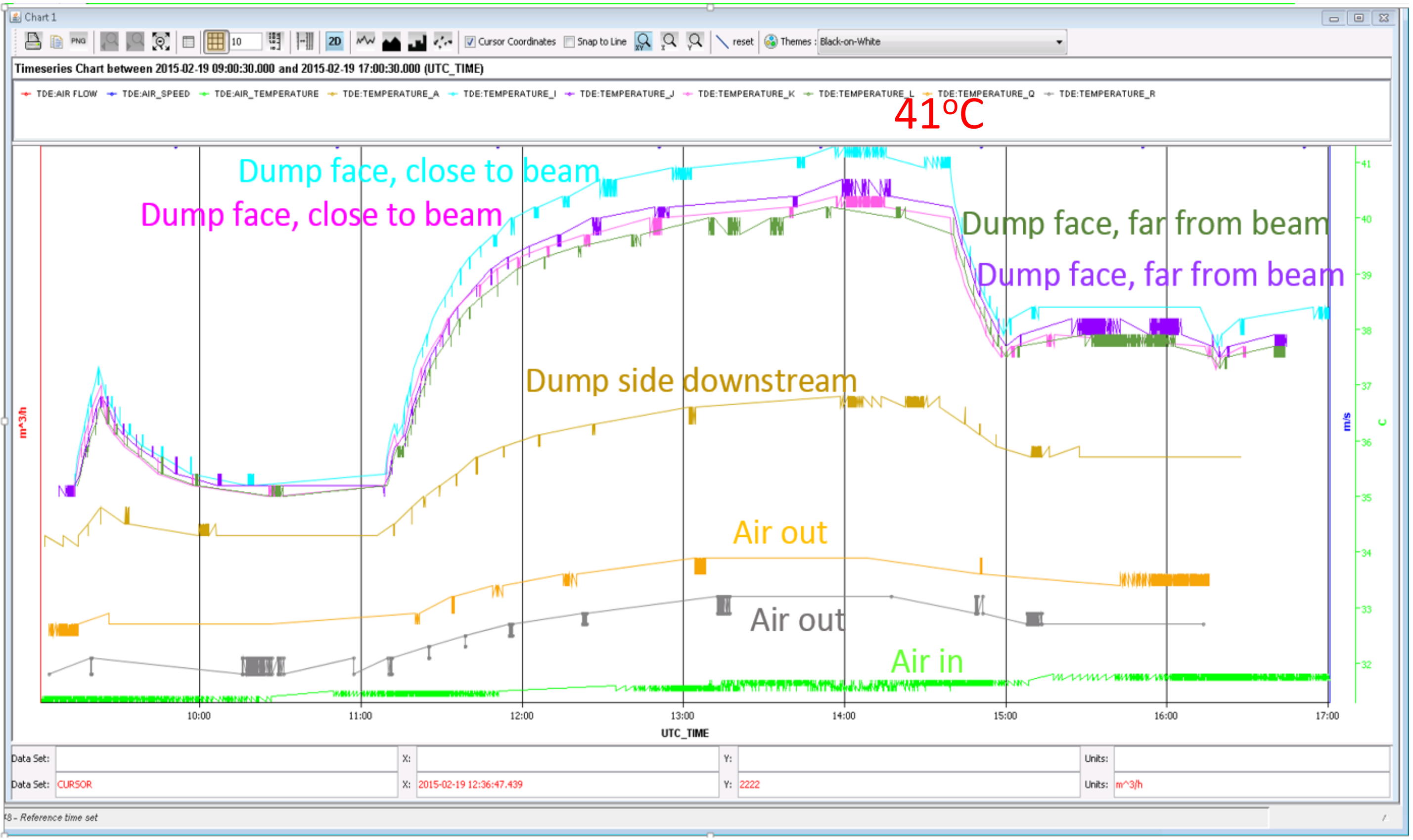


Chart 1

☑ Cursor Coordinates ☐ Snap to Line

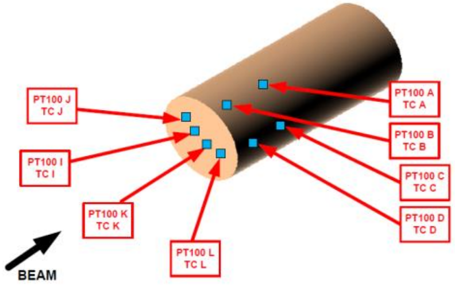
Themes : Black-on-White

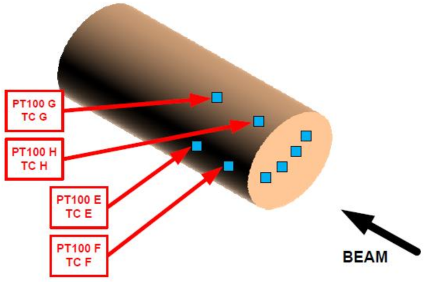
Timeseries Chart between 2015-02-19 09:00:30.000 and 2015-02-19 17:00:30.000 (UTC_TIME)

Data Set: | X: | Y: | Units:

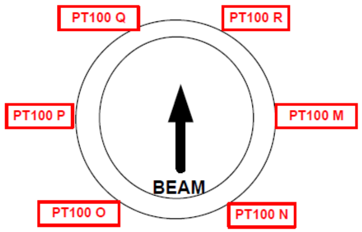
Data Set: CURSOR | X: 2015-02-19 12:36:47.439 | Y: 2222 | Units: m^3/h

18 - Reference time set



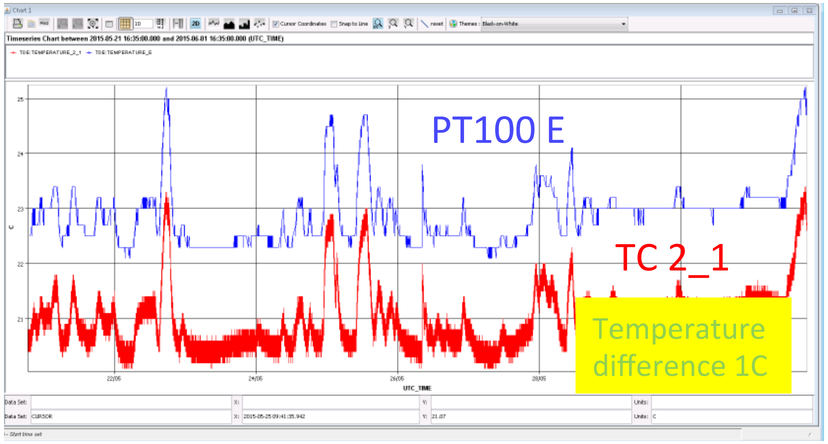


AIR Temperature



PSB Dump

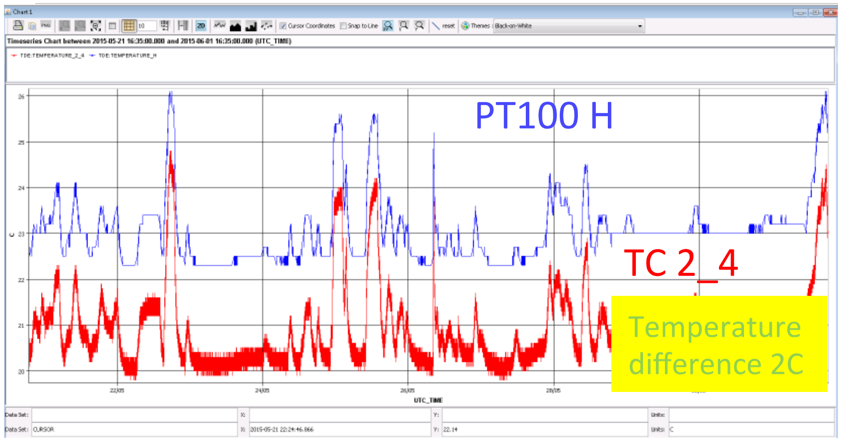
Comparison PT100 and Thermocouples for the same measurement point



PT100 E

TC 2_1

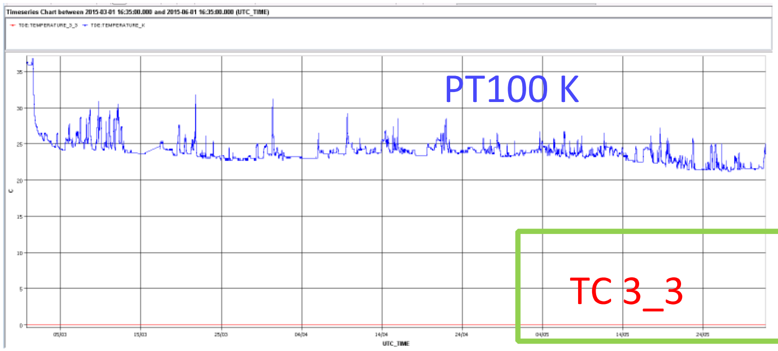
Temperature difference 1C



PT100 H

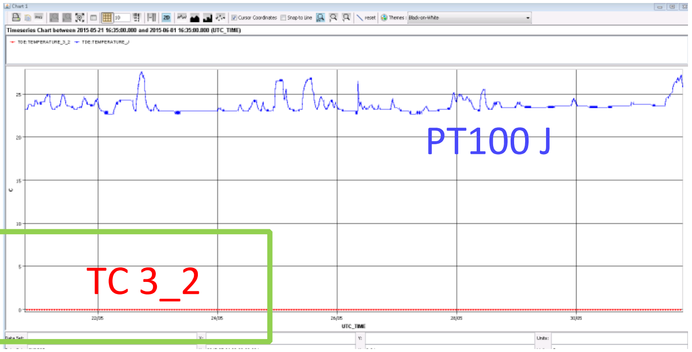
TC 2_4

Temperature difference 2C



PT100 K

TC 3_3



PT100 J

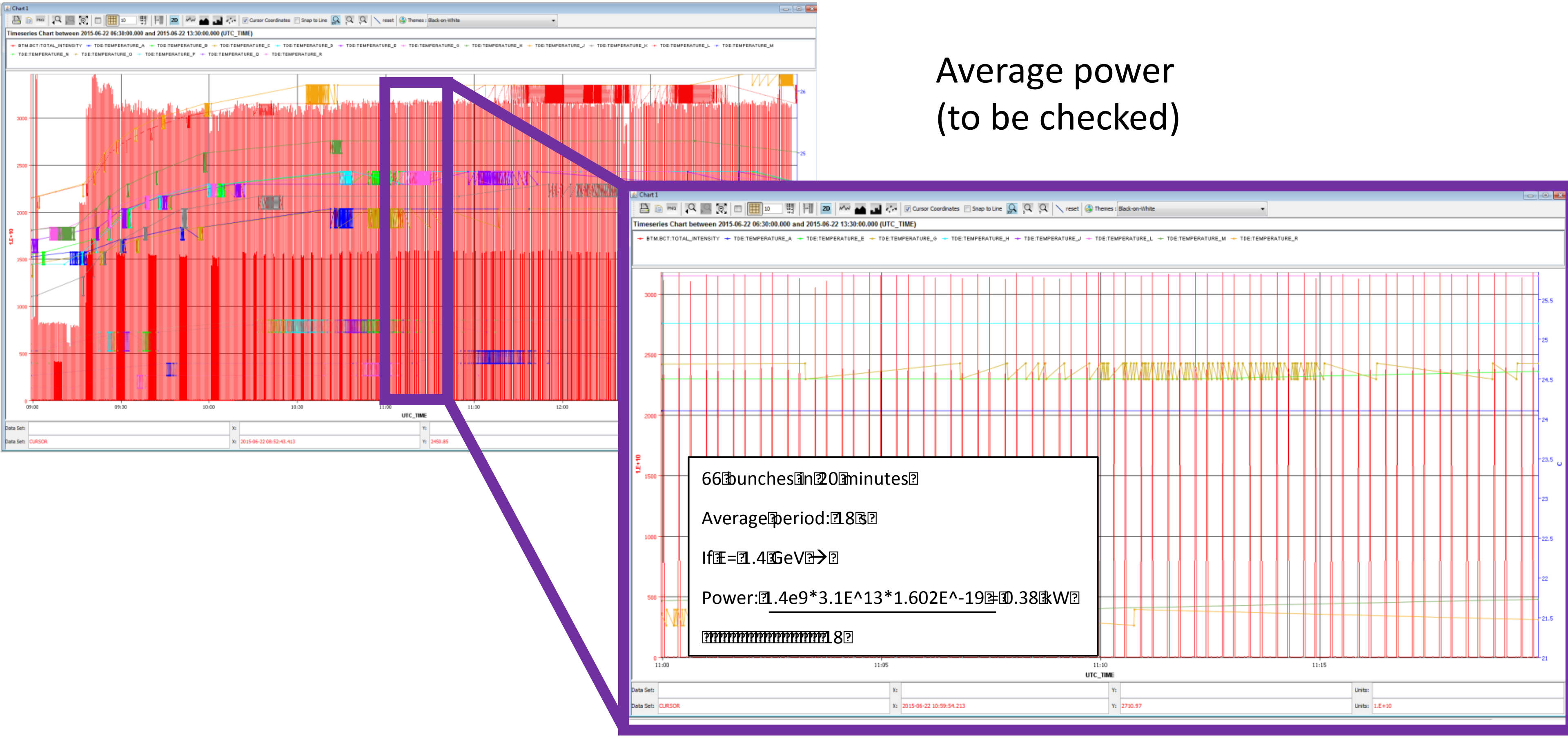
TC 3_2

PT100 F for example has always measured a temperature above 3000 C

Failure of thermocouples?

PSB Dump
Current Performance

Average power
(to be checked)



Data Set: CURSOR X: 2015-06-22 08:52:41.413 Y: 2450.85

Data Set: CURSOR X: 2015-06-22 10:59:54.213 Y: 2710.97 Units: 1.E+10

66 bunches in 20 minutes

Average period: 18 s

If E = 1.4 GeV →

Power: $\frac{1.4e9*3.1E^{13}*1.602E^{-19}}{18}$ = 0.38 kW

PSB Dump
Further work

- Observe periods with high dumping rates (high intensity)
- Estimate beam power being dumped
- Monitor temperatures
- Thermal simulations to cross-check and benchmark FE models