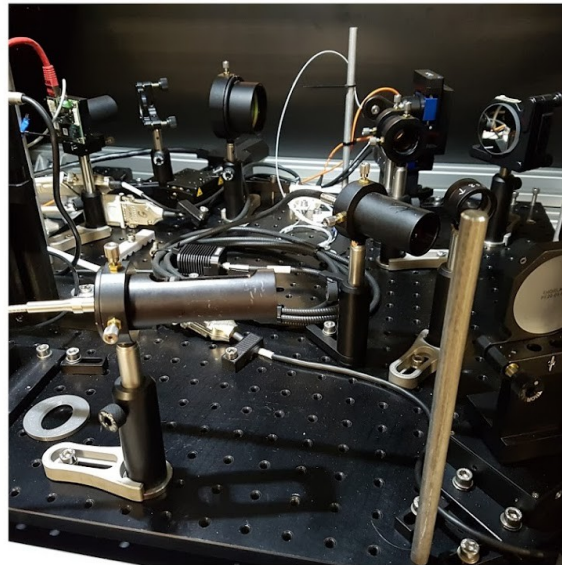
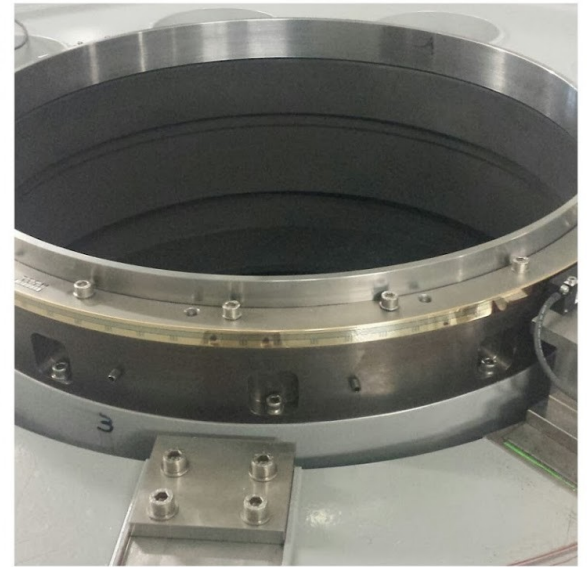
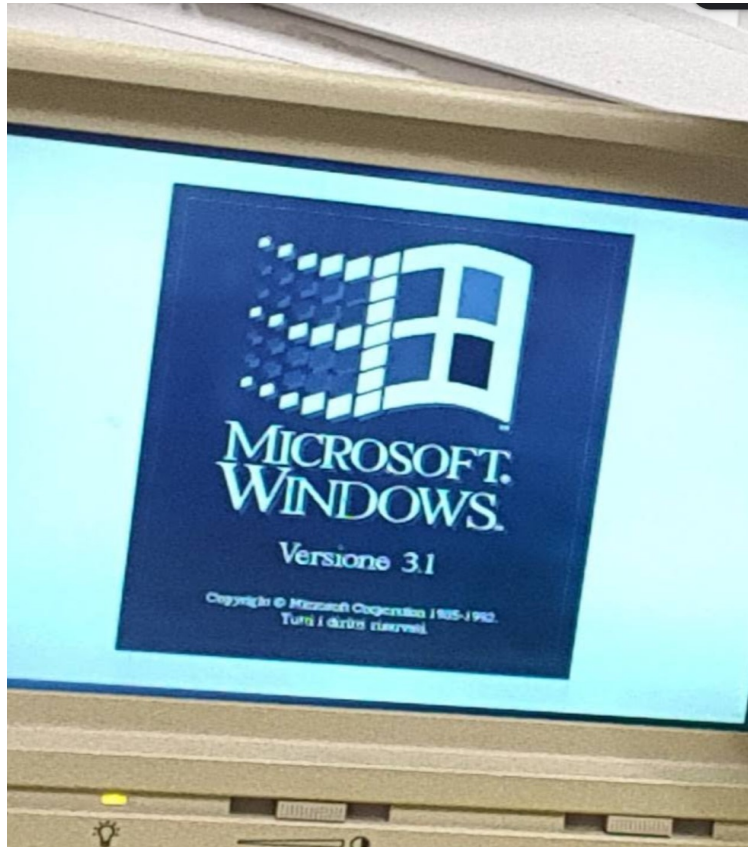


# HW and SW Instrument Control at TNG

A.Ghedina



# Instrument control:TNG specificity



Put yourself in context:

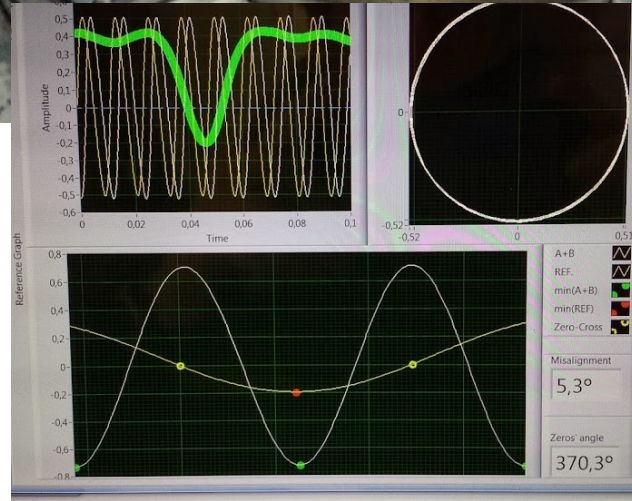
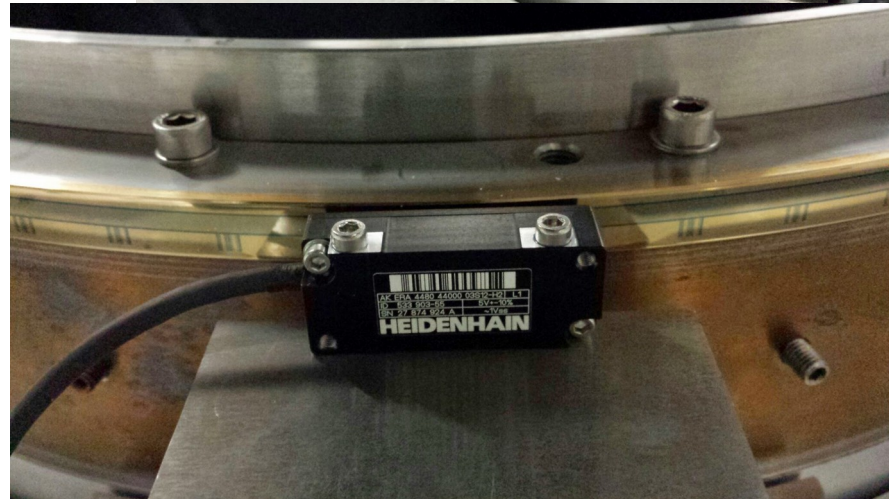
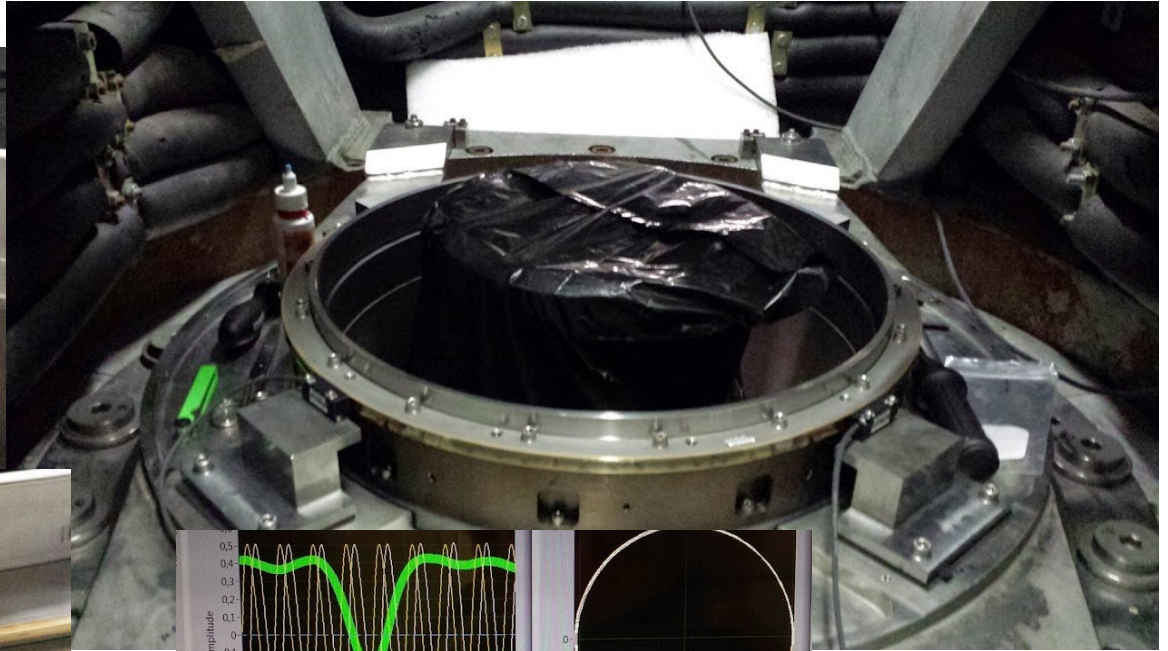
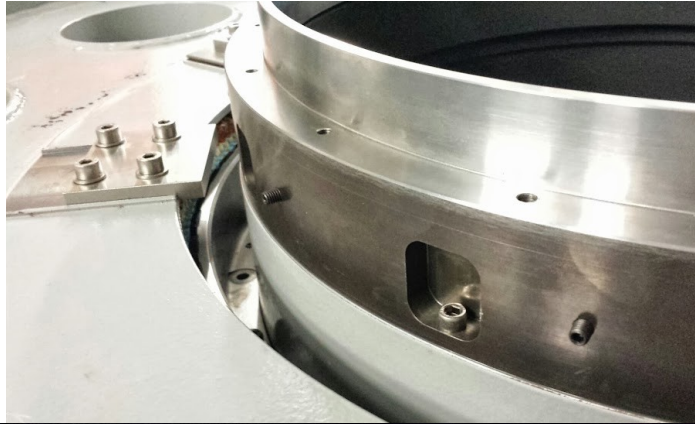
- Subsystems of the '90s
- TNG must observe
- Keep the system working and make proper upgrades, with few money and few time;
- Do not interfere with night ops;
- Everything redundant: old during the night, new during the day.
- Extra work

# Changing the whole TCS

- Encoders → mech+electronics
- Tachos/ sincroresolvers → mech+electronics
- Control electronics/ drivers/ → electronics/  
software/
- VME/pointing/tracking algorithm → still to be  
done



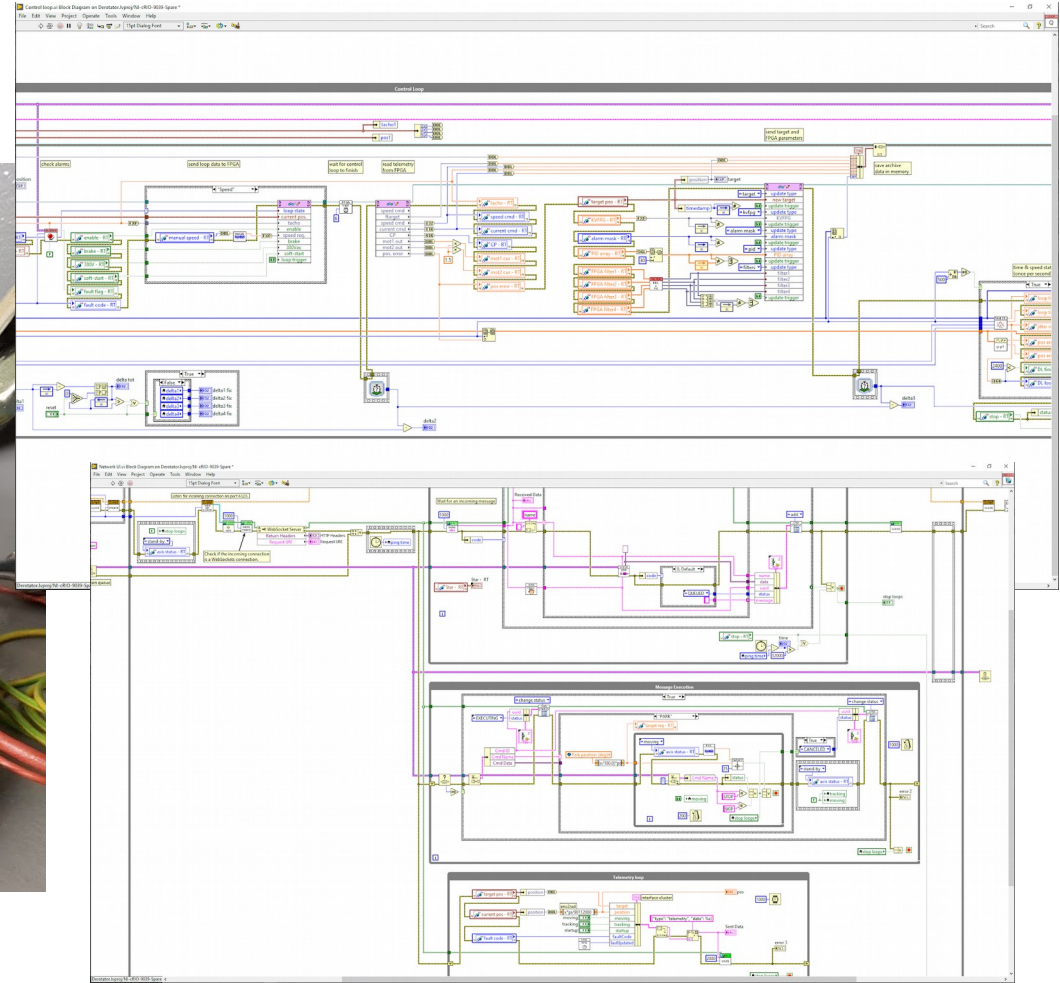
# TNG TCS 1/3: AZ/EL/DER encoders



Heidenhain  
ERA4480C /4H

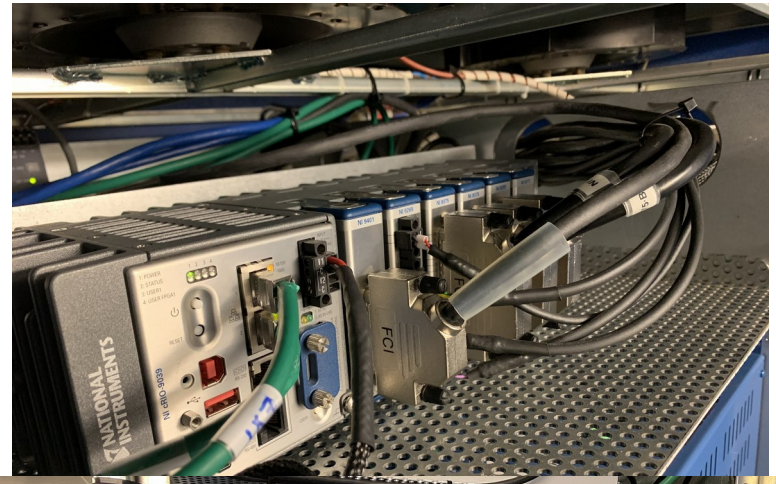
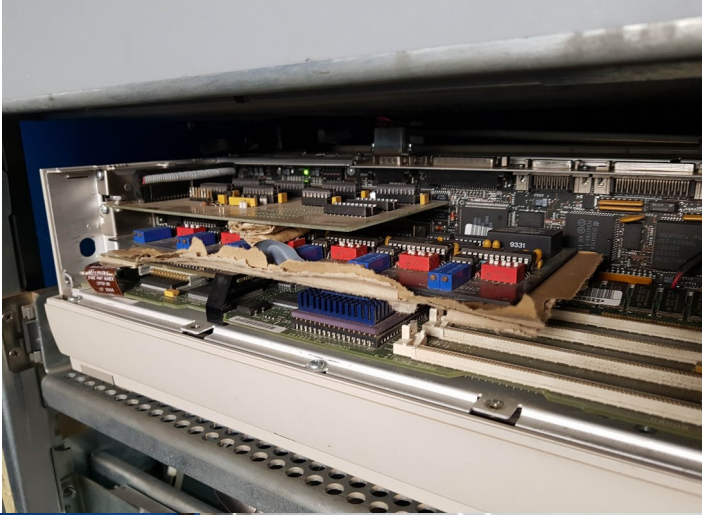
# TNG TCS 2/3: Sincro/Res y tachimetric (from analog to digital systems)

Heidenhain ECN 125 - Sincro  
RPN 886 180k – Tacho  
Labview software





# TNG TCS 3/3: Racks



# TNG new TCS core

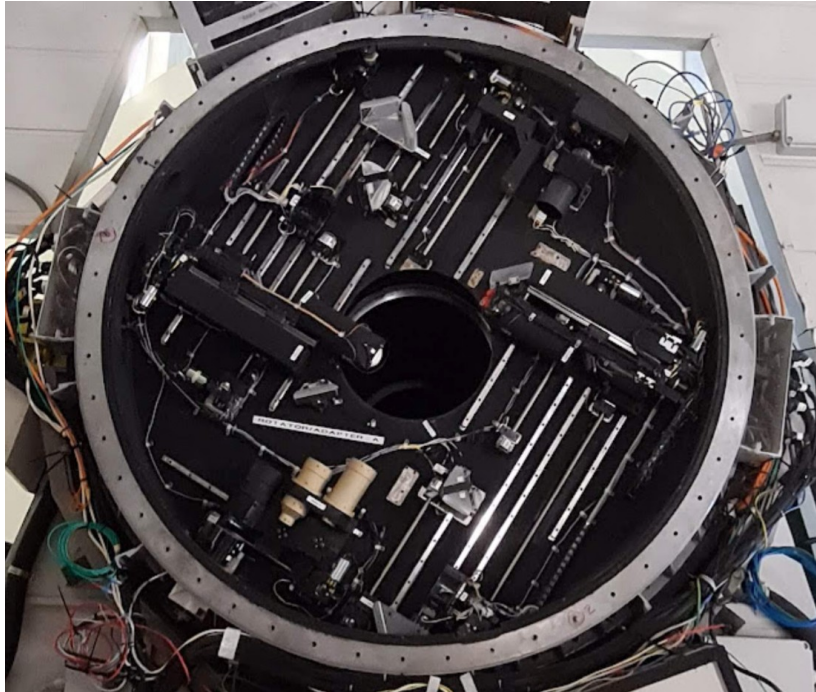
CompactRIO controller (NI) with Linux RT op system programmed in LabView RT, labview FPGA y slalib (P. Wallace), executing original algorithms of P.Schipani.

Manuel Gonzalez →





# AO(new AO), Derotator A&G(PODER) and Dolores(ARDolor): from Transputers, VME and custom electronics to COTS Arduino and web interfaces





# ROBODIMM


(Cloned also for ING)



DIMM Control Client

Normal operation | **Advanced control**

Dimm data



Selected star: Deneb

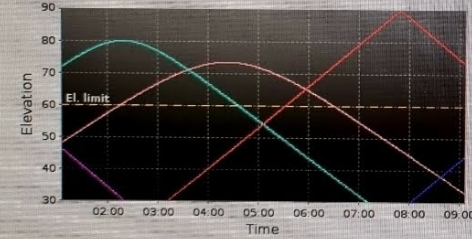
Time:	05:06:08"	LST:	21:24:30"
Ra:	09:26:36"	Dec:	61°56:22"
Azimuth:	359°45:10"	Elevation:	00°41:53"

Mean X separation:	0.146	Mean Y separation:	57.316
Std. Deviation X:	1.7615838E-6	Std. Deviation Y:	2.3288846E-6
Fried Trans:	11.79	Fried Long:	10.755
Seeing Trans:	0.857	Seeing Long:	0.94
Airmass:	1.058	Used images:	1200/1200
Baricenter 0:	30 @ 140.4, 158.28		
Baricenter 1:	52 @ 139.33, 99.33		


**0.898**

Loop Control

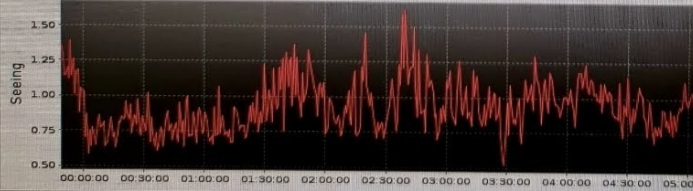
Elevation graph.



Webcam



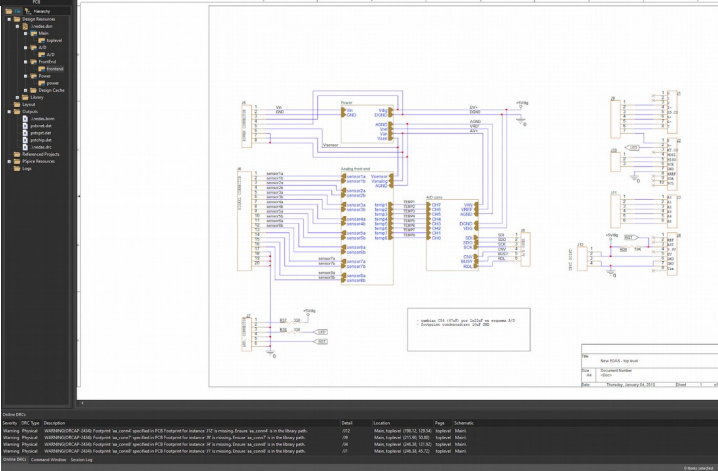
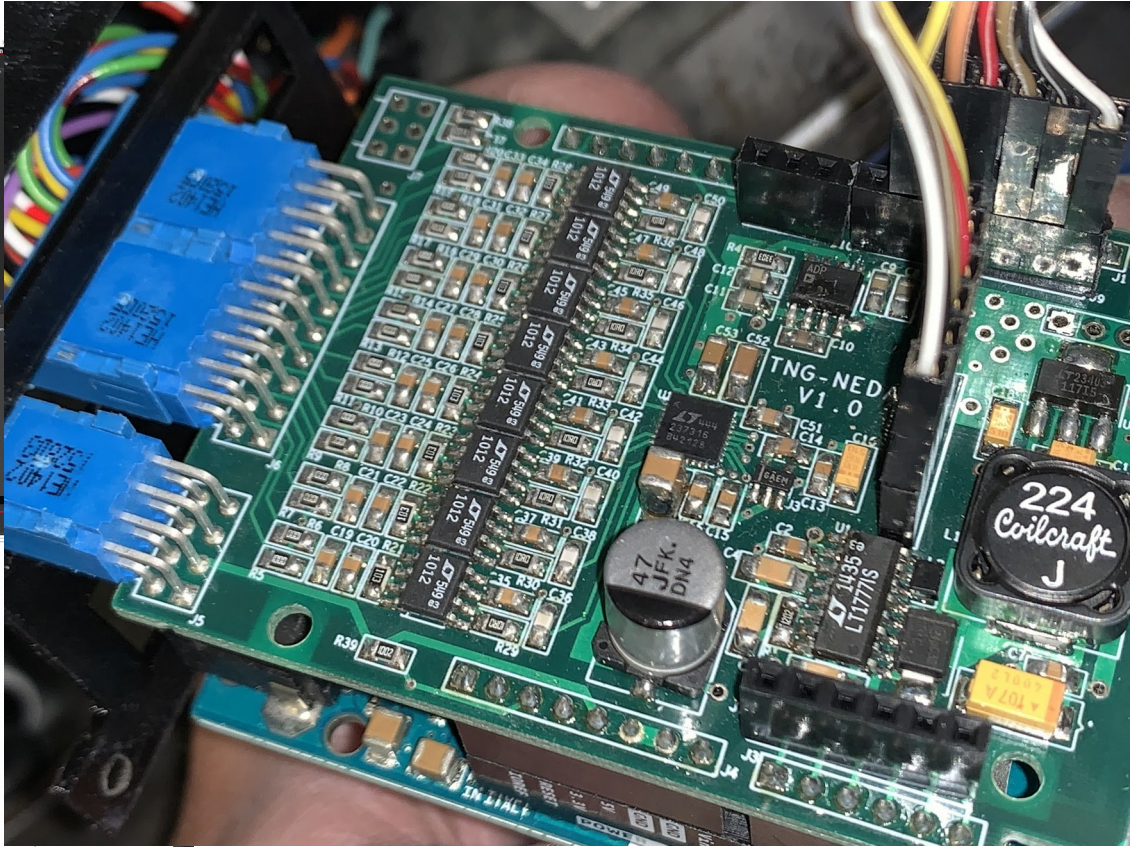
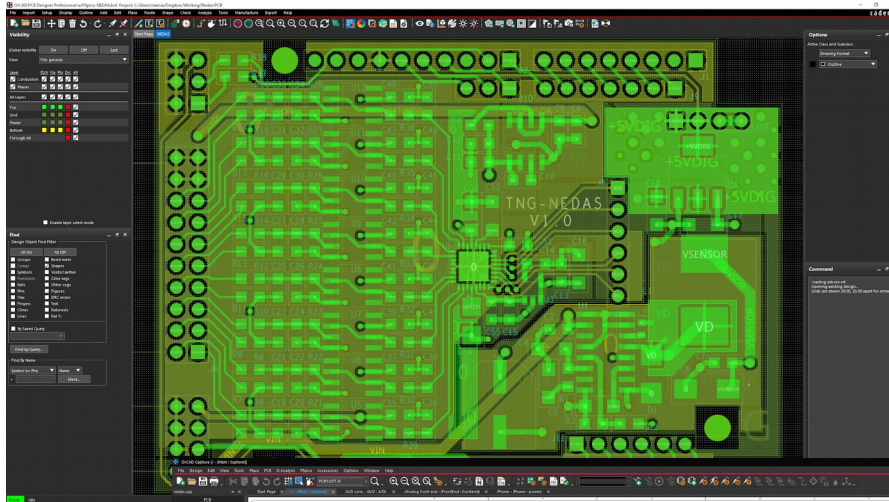
Results history



Max:	1.622 at 02:39:41
Min:	0.529 at 03:29:01
Mean:	0.931
Measures:	412



# TNG Environment Temp/RH



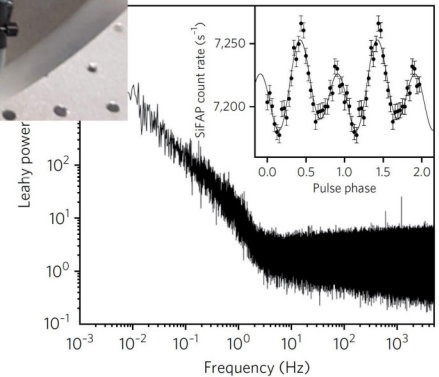
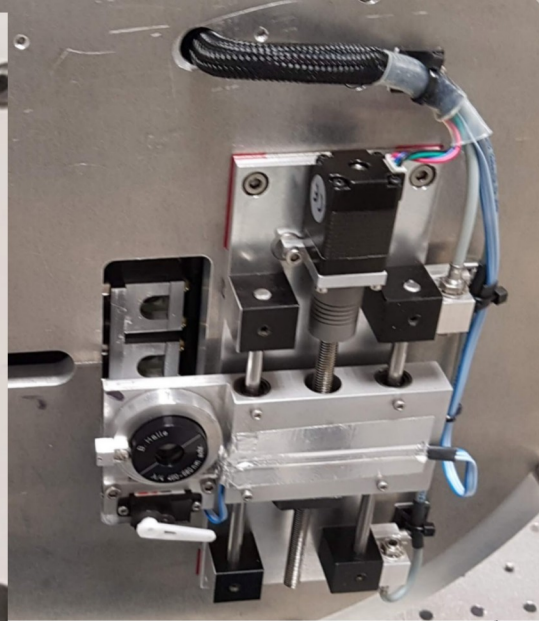
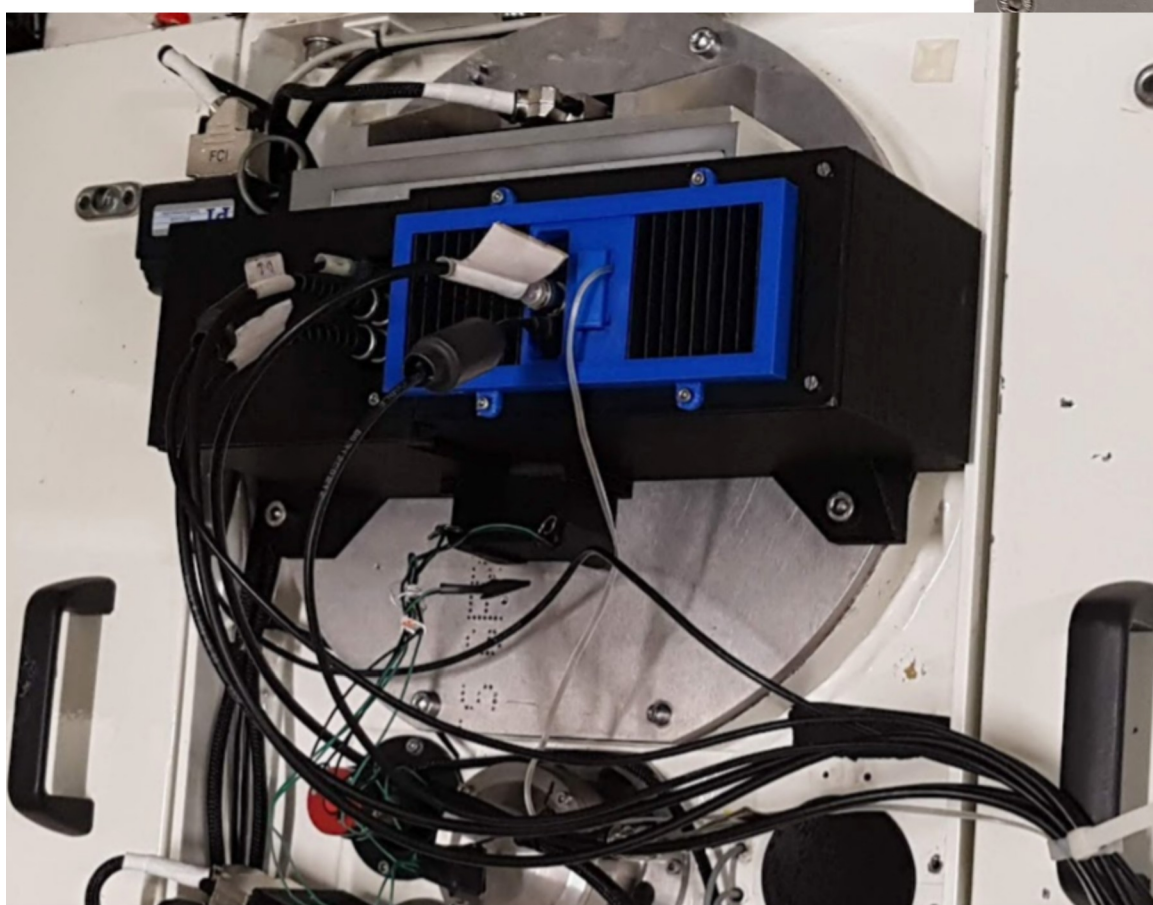
Rev	Date	By	Appr	Desc
1.0	2014-08-11	...	...	...

Rev	Date	By	Appr	Desc
1.0	2014-08-11	...	...	...

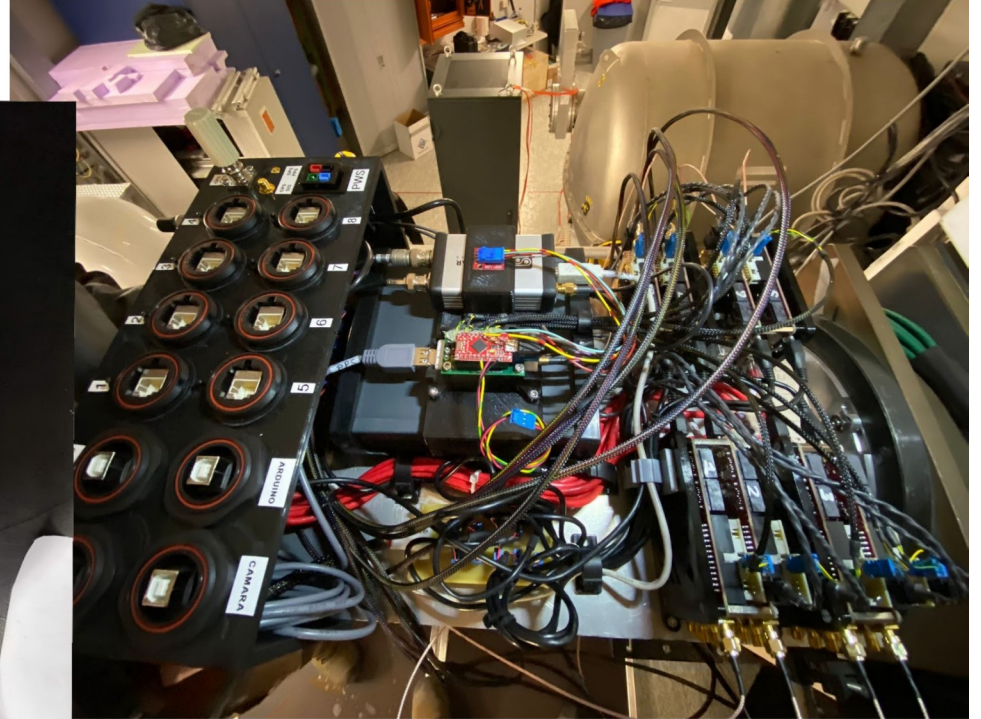
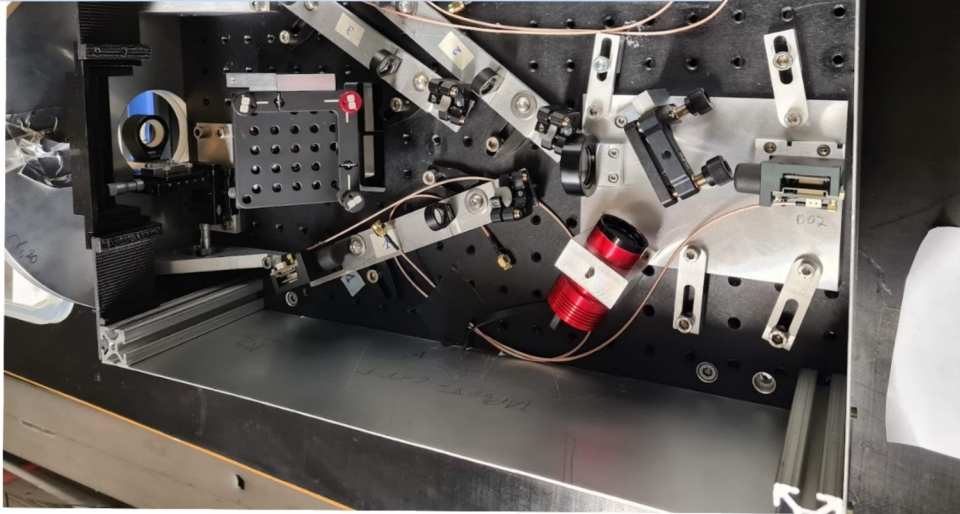
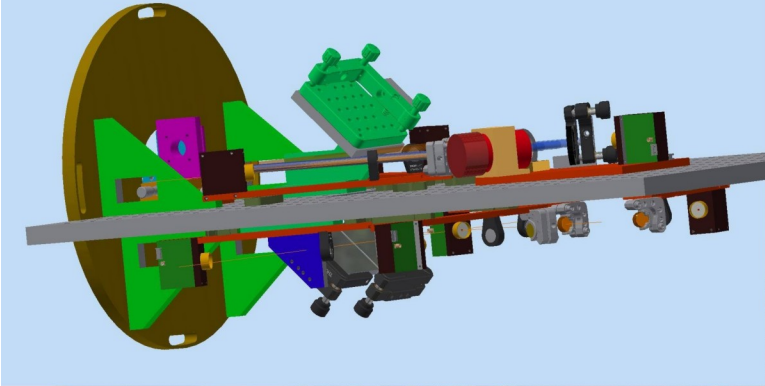


# SiFAP2(Silicon Fast Astronomical Photometer and Polarimeter)



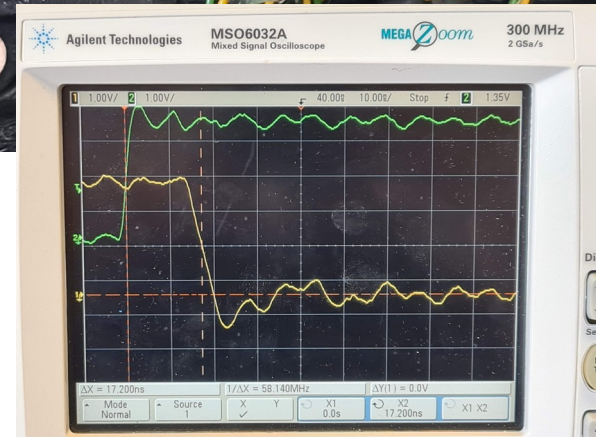
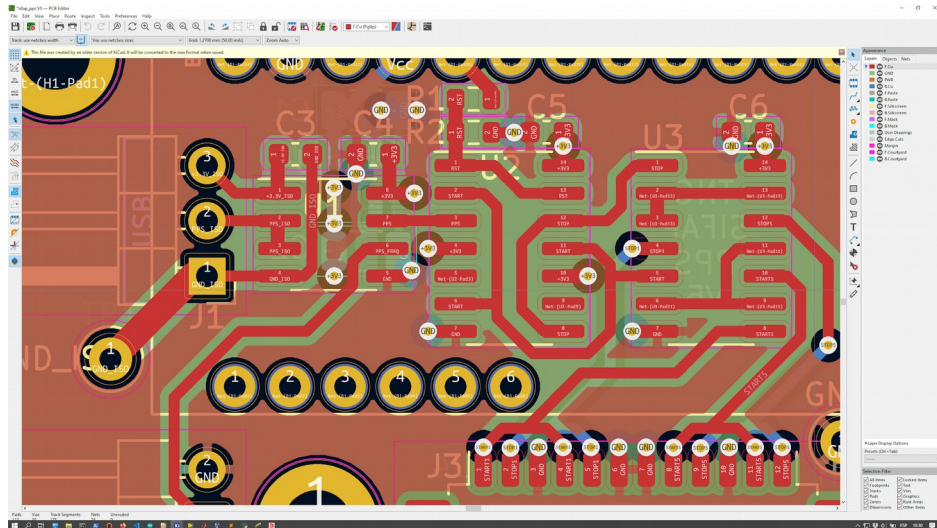
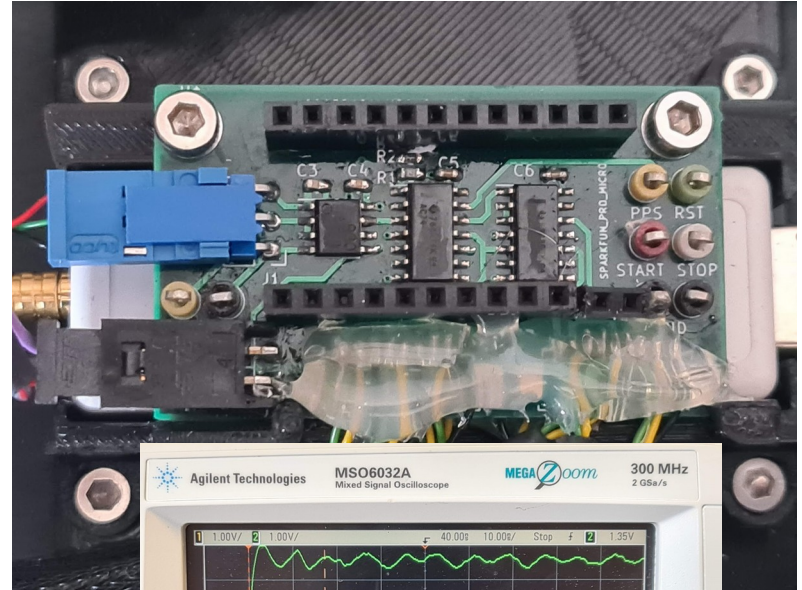
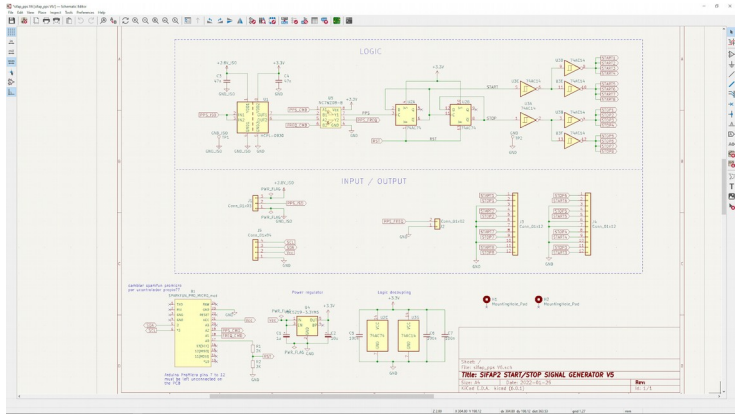
Coherent optical pulsations of PSR J1023+0038.

# SiFAP4XP: optics/mechanics/electronics





# SiFAP2/SiFAP4X GPS-PPS board



# TNG expertise on HW and SW for instrument controls:

- Wide Opto-mecha-tronics knowledge;
- Optomechanical design, provision and alignment, and CNC mech manufacturing;
- Encoders, Stepper and DC Servos;
- Custom PC boards design, manufacturing, testing (SMD, multilayer and new reworking machine);
- Control logic development, programming from machine level to python, java, web interfaces, GUI interacting with OCS and TCS;
- **Team of enthusiast people, smart and devoted to their jobs, able to take decisions under pressure, willing to solve problems and learn new things.**



