



Collaborations SDL on: UV, VUV, SXR Spectroscopy and Tomography Diagnostics

F. Bombarda

Frascati, WIP 24/01/2022

Procurements of a Divertor Spectrometer for JT60SA – WPSA call Oct 2018

- F4E Official connection with JT60-SA/QST
- EUROfusion main sponsor
- ENEA-RFX beneficiary, M. Valisa Project Leader
- Other Labs:

1. ENEA-Frascati
2. CCFE
3. IAP
4. IPPLM

WORK to be carried out at Frascati

- ☐ Assembly of spectrometer
- ☐ Integration and alignment of spectrometer and optics
- ☐ Calibration



Double 251-McPherson made available by FZJ, to be refurbished with new gratings and 2D detectors for added imaging capabilities

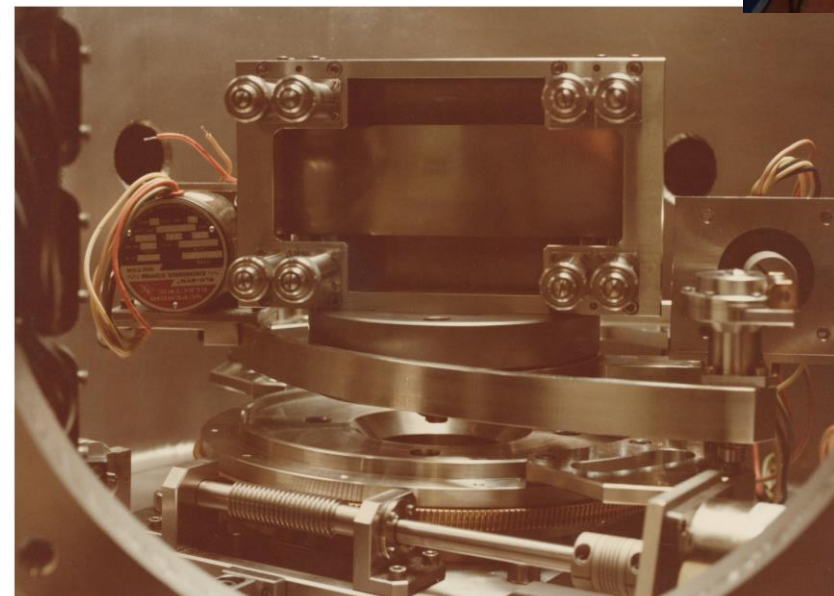
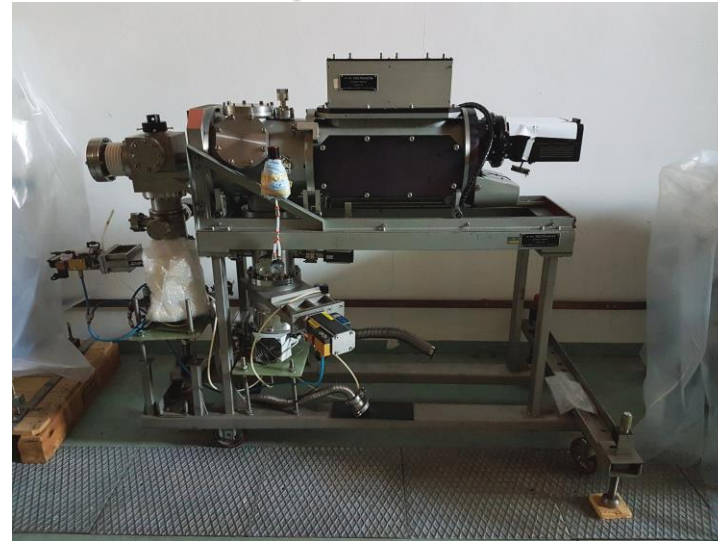
Delivery: End of 2022

Ca 8 pm

DTT : Task 2021 Passive Spectroscopy UV-SX

Report delivered, task completed

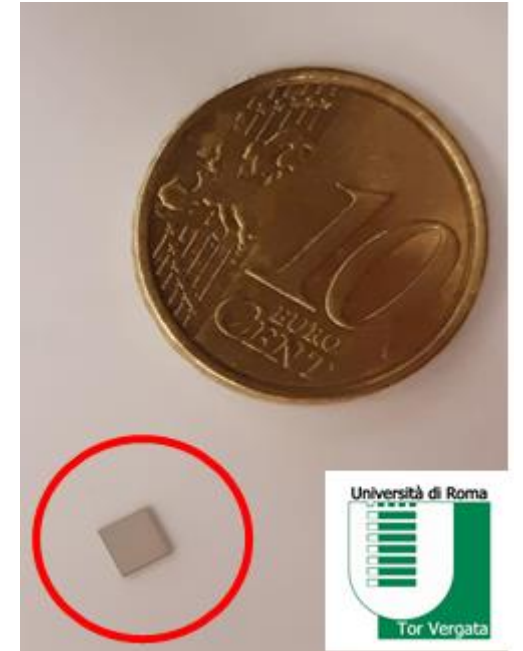
NAME	AFFILIATION
Francesca Bombarda	ENEA FSN FUSPHY SDL (2.25 pm)
Sarah Bollanti	
Luca Mezi	
Cesidio Cianfarani	
Francesco Flora	
Paolo Di Lazzaro	
Daniele Murra	RFX (2.25)
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Ruggero Milazzo	Uni. Catania (0.5)
Francesco Leone	
Marina Giarrusso	INFN



1. Schwob
2. McPherson
SPRED
3. Curved
Crystal
Spectrometer

Uni. Tor Vergata – Dept. Ind. Engineering

- Diamonds are forever...and (almost) everything: neutrons and particles, **UV and SX radiation**
- JET and FTU → Tomography/Bolometry
ELMs, Pellet ablation, MARFEs...
- Proposed for DTT Tomography (Task 2021 completed)
- *Interdigitated* tested on DPP
- 1st module of tomographic head to be tested on Protosphaera
- *Ad hoc* front-end electronics under development with CAEN
- Also good for ICF: ABC
- ITER collaboration for **neutral particle** detector



Outcome since 2017:

5 Conf. Contributions
2 Prizes
3 Publications
3 Int'l collaborations

Uni. Catania: Ultra high-resolution Spectroscopy

- Visible Spectropolarimeter FRESCO x Protosphaera (Prof. F. Leone)
- LAPSUS Project (Dr M. Giarrusso) x DPP, HC,
- CHIANTI database



- ❑ This so-far voluntary collaboration aims at introducing spectroscopic techniques in use for astrophysical observations to fusion plasmas
- ❑ The enormous amount of data available from years of experiments in relatively well controlled conditions allows for much needed validation of calculations

CEA – ENEA – DTT

- Started in 2021, details still being worked out, broad range of topics
- In parallel with WP TE activities
- Main focus on W sources → VIS, UV Spectroscopy, Bolometry, Thermography
- Inversion procedures of signals integrated over large energy ranges
- Synthetic diagnostics for optimization of LoS, number of sensors, etc
- IMAS
- GEM /other (Danilo)
- Diamonds
- Side topics of interest: RE generation, Crystal spectroscopy.

SPARC: Soft X ray diagnostics



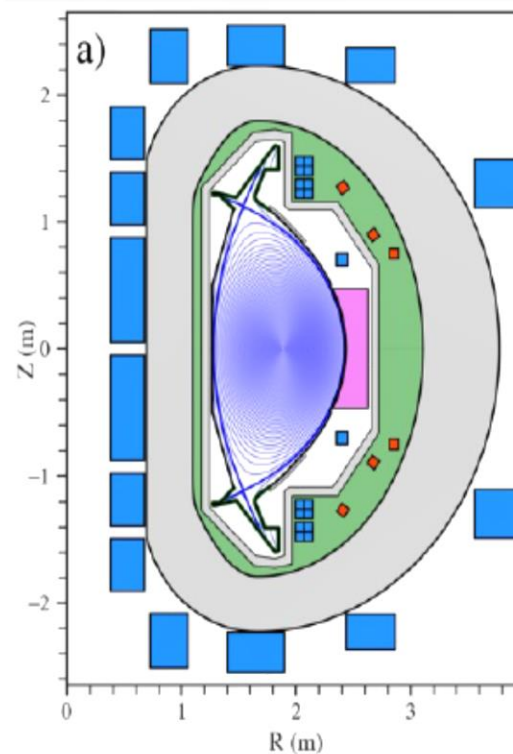
- Old time contacts with MIT PSFC C-Mod team revived
- Collaboration launched on CVD diamond arrays for tomography and Crystal spectrometer



Rendering of SPARC site in Devens (MA).

Overview of the SPARC physics basis towards the exploration of burning plasma regimes in high-field, compact tokamaks

P. Rodriguez-Fernandez, 28th IAEA FEC, OV-P4 (2021)



Parameter	Value
B_T	12.2 T
I_p	8.7 MA
R_0	1.85 m
a	0.57 m
κ_{sep}, κ_a	1.97, 1.75
δ_{sep}	0.54
$P_{ICRF,max}$	25 MW
$\langle n_e \rangle$	$3.1 \cdot 10^{20} \text{ m}^{-3}$
Δt_{flatop}	10 s
ϕ_{tot}	42 Wb
q_{Uckan}^*	3.05
f_c	0.37