



WP8 Status

Alessandro Cianchi

University of Rome Tor Vergata

Marco Zangrando

Elettra Sincrotrone Trieste



Diagnostics for compact machine

We need compact diagnostics

Our choices are driven by the request to squeeze every single diagnostics element and try to integrate in the layout in a not too much perturbing way, in order to save space



Diagnostics definitions

The basic elements for every kind of measurement are defined.

Striplines inside the quads are our choice of trajectory monitor.

Cavity BPM will be used between undulators modules

Wakefield monitor will be presented only as a possible and future option.

ICT toroids will be used for accurate charge measurement.

TDS (Polarix) will be used for longitudinal phase space characterization.

Compact view screens will be used for envelope and emittance measurement.



Trajectory

Striplines inside 25 mm diameter quads

CBPM between undulators modules

View screens

The modules are different in Linac 1,2 with respect to Linac 3.

We can put 1 view screen every 4 structures in Linac1 and Linac2.

Every 8 structures in Linac 3 (putting a drift if needed for symmetry)

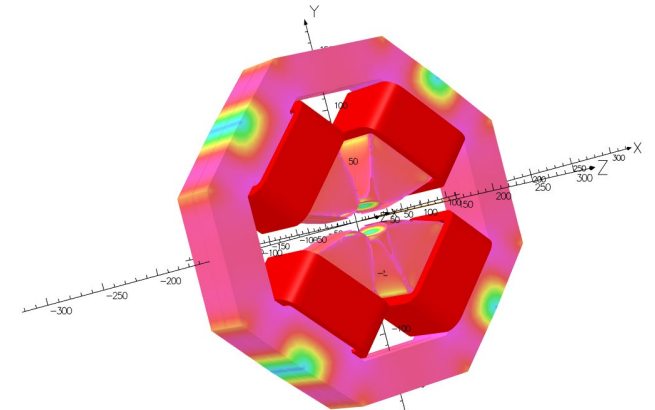
TDS

1 after BC1, 2 before undulators and 2 after the undulators (length, resolution, power to be defined)

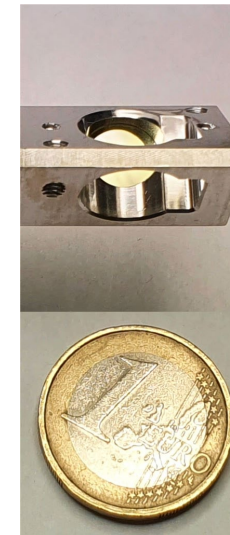
Emittance measurements in 6 points:

1 with Solenoid scan in the gun, 5 with quadrupole scan after LH, BC1, BC2, before both undulator lines.

- Aperture: 25 mm diameter



Courtesy B. Shepard

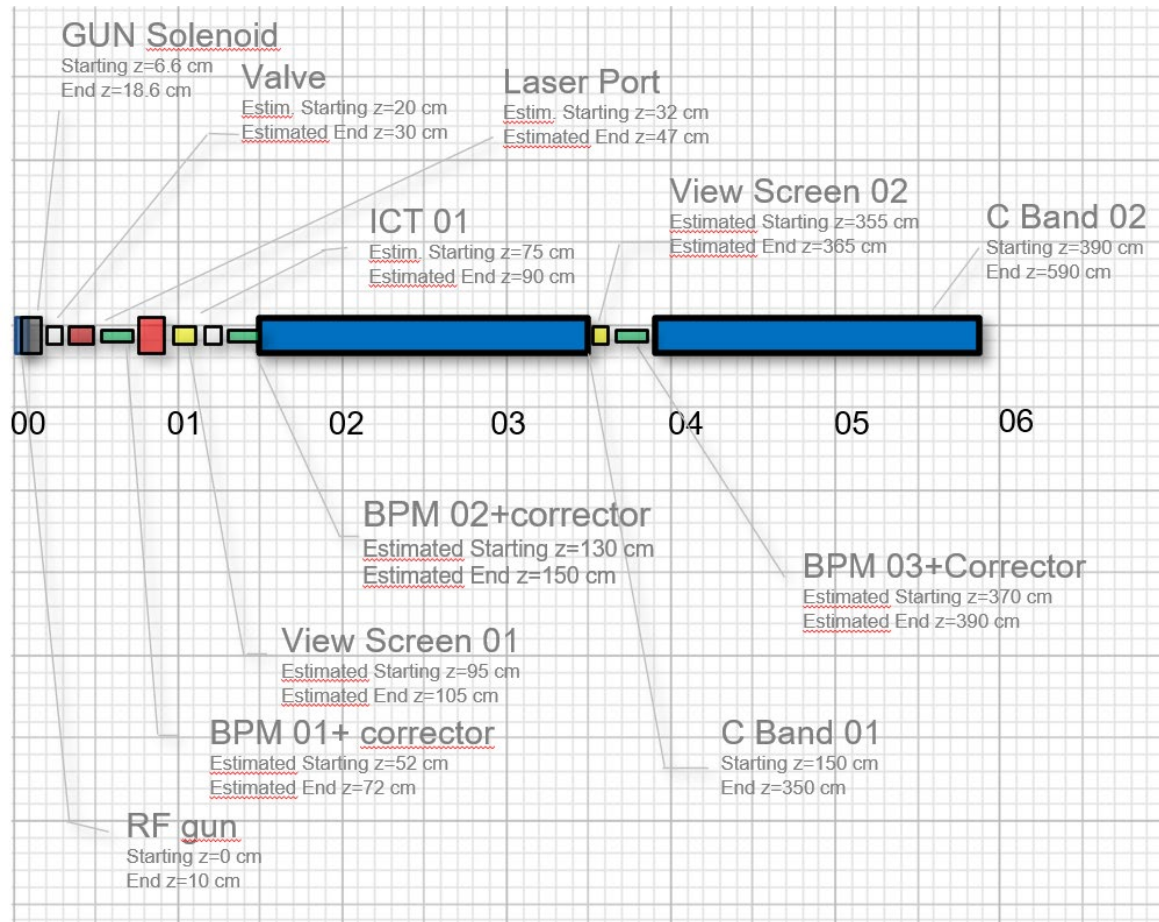


Compact view screen
Courtesy V. Lollo



Diagnostics layout:

Injector diagnostics layout for injector up to the end of the C bands.





Contents

Diagnostics	4
1 Introduction	5
1.1 Introduction	5
2 Diagnostics requirements and Instrumentation	6
2.1 Diagnostics requirements	6
2.2 Beam Instrumentation	6
2.2.1 Charge	6
2.2.2 Transverse size measurements	7
2.2.3 Trajectory diagnostic	8
2.2.4 Longitudinal diagnostics	9
3 Diagnostics Layout	10
3.1 Injector	10
4 Cost Estimation	11
4.1 Whole machine	11
4.2 Injector	11
4.3 Linac0	12
4.4 Linac1	12
4.5 Linac2	12
4.6 Linac3	12
4.7 BC1	12
4.8 BC2	12
4.9 SXR Bypass	12
4.10 HXR Bypass	12
4.11 Undulators	12

Device	# of items	Cost per item (k€)	Total cost (k€)
Stripline BPM	5	13	65
Stripline inside quad	76	13	988
Cavity BPM	17	20	340
Screen	38	15	570
EOS arrival monitor	2	40	80
PolariX	4	800	3200
ICT Bergoz	9	20	180
Coherent radiation measurement	2	15	30
ICCD station	2	40	80
Faraday Cup	1	15	15
BLM	4	15	60
Total			5628

Table 4.1: Cost estimation for the diagnostics beamline for XLS

Device	# of items	Cost per item (k€)	Total cost (k€)
Stripline BPM	5	13	65
Screen	4	15	60
EOS arrival monitor	1	40	40
ICT Bergoz	1	20	20
Coherent radiation measurement	1	15	15
Faraday Cup	1	15	15
Total			215

Table 4.2: Cost estimation for the diagnostics for XLS injector



Status

Definition of the diagnostics **done**

Position of the diagnostics **done**

Integration in the machine layout **in progress**

Cost estimation **done** but it is always in progress

Photon diagnostics **just started**

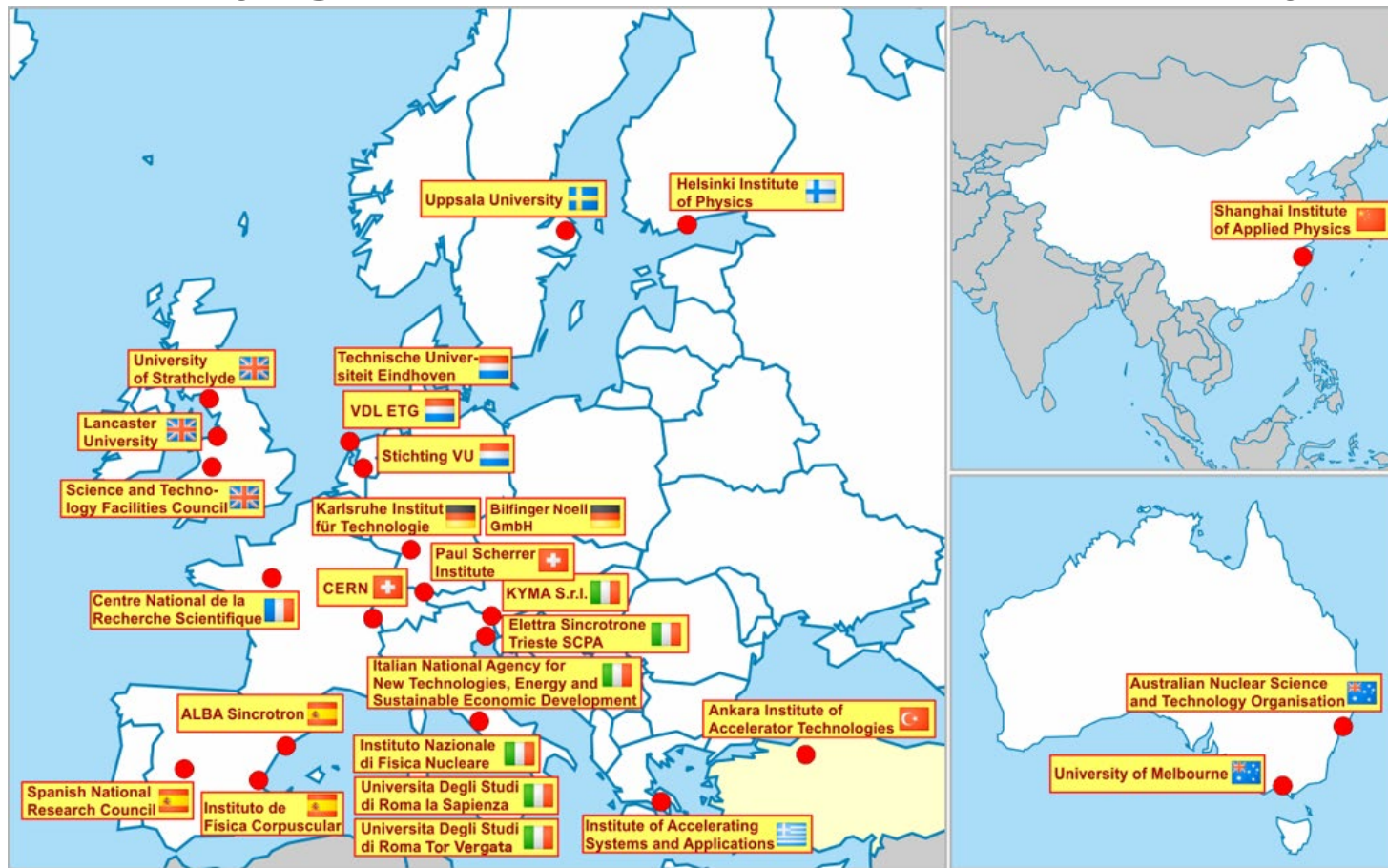
Actions to do list next: TDS definitions, final implementation in the layout



Thank you!

CompactLight@elettra.eu

www.CompactLight.eu



CompactLight is funded by the European Union's Horizon2020 research and innovation programme under Grant Agreement No. 777431.

