



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under GA No 101004730.

WP7: VARIABLE Dipole for the Elettra Ring -

IFAST Kick of meeting, **VADER**

04/05/2021

Yannis Papaphilippou, CERN

IFAST



Variable Dipole for the Elettra Ring – VADER

- **Task 7.3** within I.FAST WP7: High Brightness Accelerators for Light Sources
- Partners and contact persons:



Y. Papaphilippou



F. Toral



Elettra Sincrotrone Trieste

E. Karantzoulis



R. Geometrante

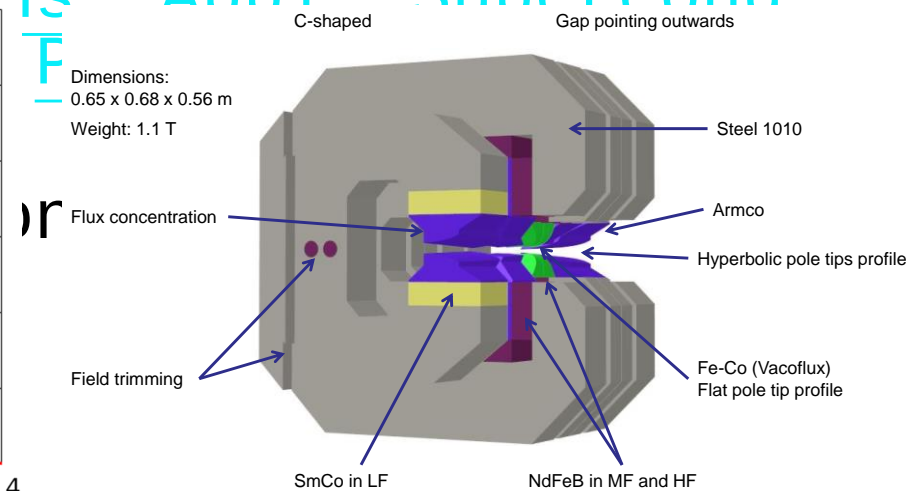
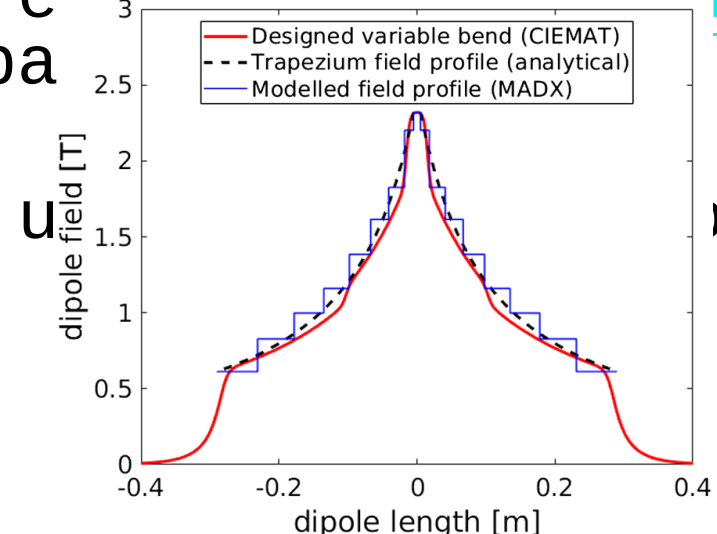
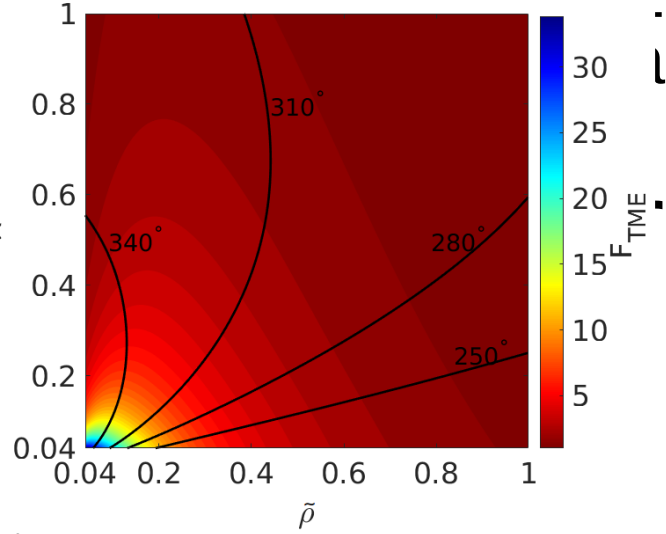


objectives

- **Fabricate** an innovative dipole magnet prototype with longitudinal varying dipole field, including a transverse gradient for the ELETTRA upgrade
- Permanent magnet **concept** with trapezoidal bending radius, **2.3 T** peak field and **~10 T/m** gradient, already established (CERN/CIEMAT)
- Proved the **horizontal emittance reduction** to ultra-low levels of i.e. **~60 pm @ 2.86 GeV**, for the CLIC DR (M. A. Domínguez Martínez et al)

TEEE Trans Annl Supercond

F_{TME}



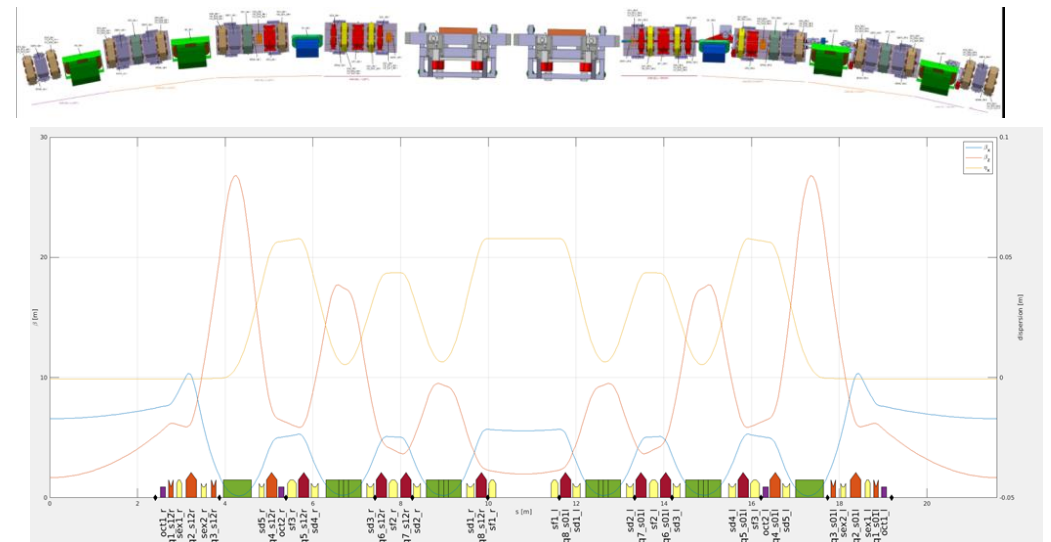
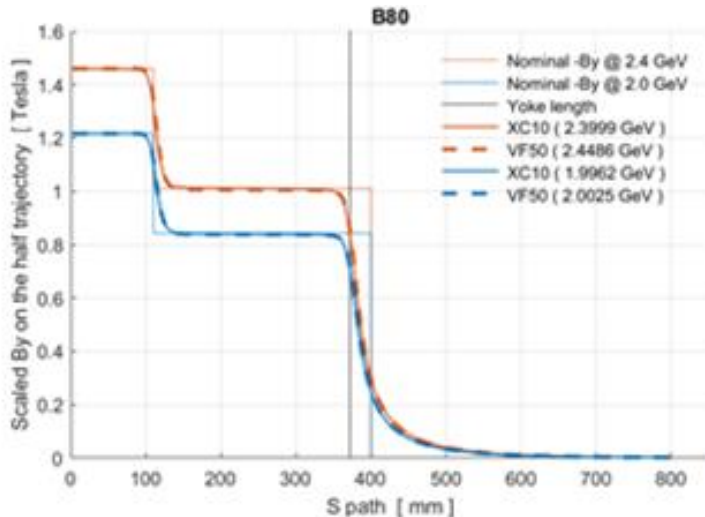
objectives

- Design to be modified/adapted to lattice for upgraded ELETTRA SR, in order to further reduce the horizontal emittance **beyond 140 pm** proposed for **ELETTRA 2.0**.
- **Optics** calculations for the storage ring Multi-Bend Achromat (MBA) cell, by replacing dipoles with longitudinally varying ones with an **optim** to the **step-like f**

2.4 GeV	L1 T G=21T/m	L2 T G=0	L3 T G=21 T/m	Emittance pmrad
VH-LG	0.77 T	2.16	0.77	140
H-LG	0.92 T	1.78	0.92	150
M-LG	1.036 T	1.46	1.036	177

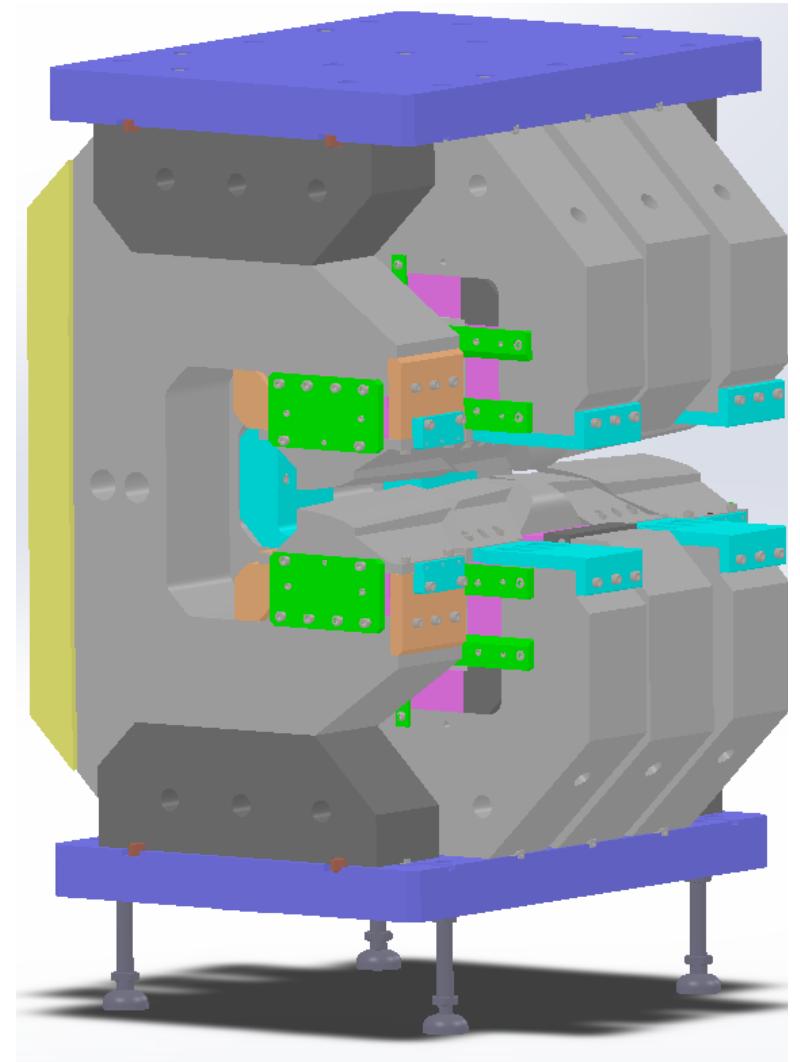
(as compared

E. Karantzoulis



objectives

- **Specifications** of magnet used for **magnetic** and **mechanical** design, based on the experience already gained by CIEMAT.
- **Manufacturing** conducted by KYMA, a leading industrial partner in the magnet technologies for X-ray sources and, in particular, insertion devices.
- **Prototyping** and **acceptance tests** to shape **industrialisation** procedure



VADER timeline

	Deliverable description	Month
1	Magnet Specifications based on optics calculations for ELETTRA	12
2	Magnetic and mechanical design (including fabrication drawings)	24
3	Fabrication of the prototype	42
4	Acceptance tests	48

Milestone MS 26

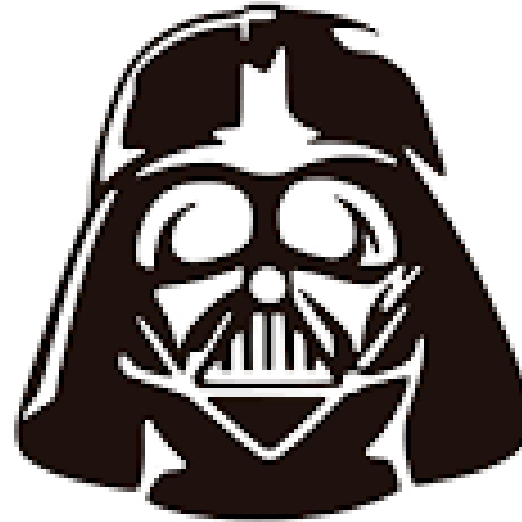
Deliverable D7.3

Milestone MS 27

- **1st Collaboration meeting:** 29/04/2021, discussion on initial steps including CLIC prototype progress, Elettra ring constraints, analytical approach for magnet specifications, lattice design
- Work towards **magnet specifications ~June 2021** (CERN Fellow), collaboration of CERN/Elettra, input of CIEMAT for magnetic design iterations
- **Specification document** to be ready and approved by **May 2022**
- **Magnetic and mechanical design starting at June 2022**, responsibility of CIEMAT with input from all partners (in particular KYMA for fabrication)
- Magnetic and mechanical design (including drawings): **document** to be **ready** and approved by **May 2023**
- Fabrication of the prototype by KYMA to start on **June 2023**, ready for acceptance tests by **January 2025**



VADER



**MAY
THE FIELD
BE WITH YOU**



iFAST



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under GA No 101004730.