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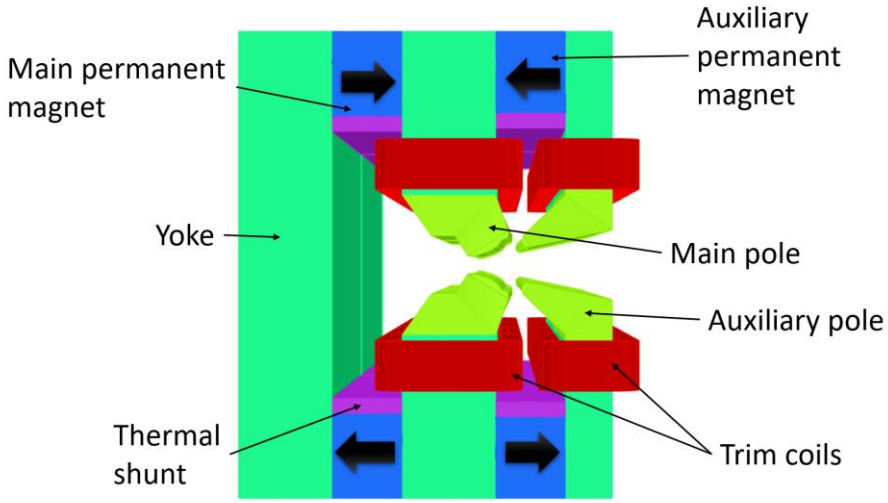
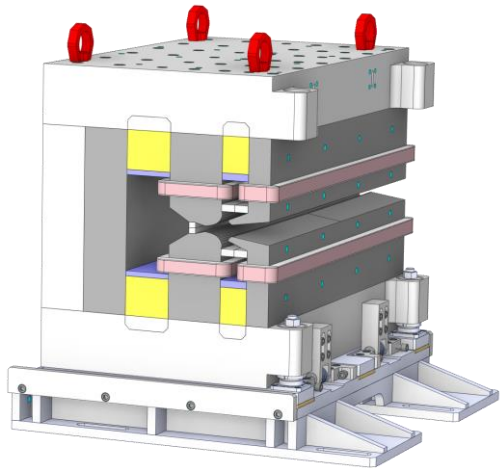
I.FAST Period 1 Review, 07.02.2023

WP/Task structure and objectives

- *Manufacture and test a prototype permanent magnet (PM) based combined function dipole-quadrupole (DQ) magnet.*
- *Magnetic design aimed at meeting the same parameters as the electromagnetic DQ magnets required for Diamond-II upgrade.*
- *Dipole = 0.7 T, Gradient = 33 T/m*
- *Dipole and gradient fields require independent tuning of ±2.5% using trim coils for commissioning purposes.*





Summary of activities in P1

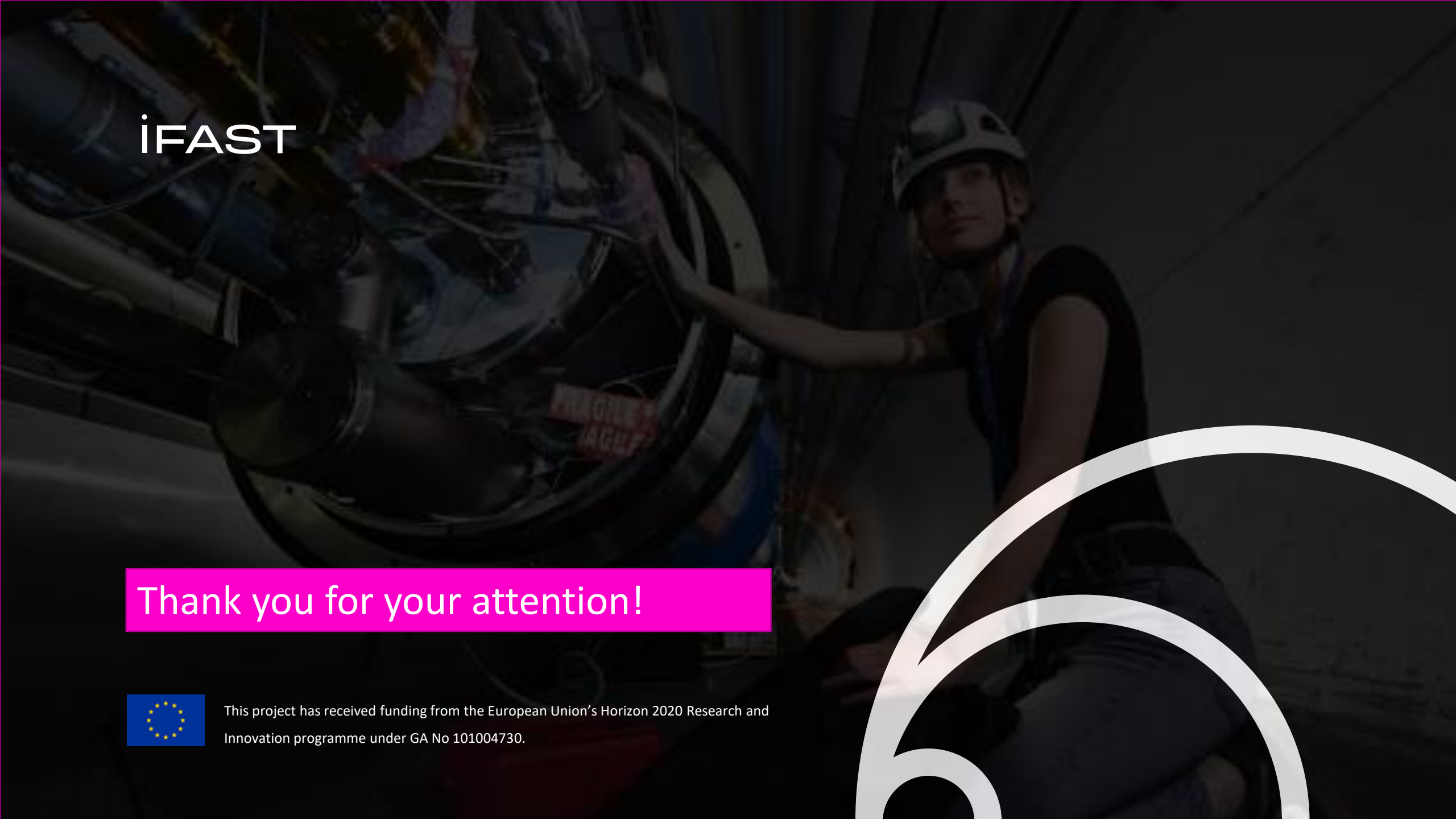
- *Magnetic design complete by STFC, including:*
  - *Pole shape optimisation*
  - *Setting dimensions of permanent magnet and thermal shunt material*
  - *Machining and alignment tolerance studies*
  - *Trim coil design*
  - *Final magnetic design report completed 28/11/2022*
- *Initial mechanical design complete by Kyma, including:*
  - *Support structure*
  - *Conceptual assembly process and girder design*
  - *Installation process*
  - *Conceptual mechanical design report completed 13/05/2022*

Deliverables and Milestones P1

- *No Deliverables / Milestones scheduled for WP11.3 in Period 1*
- *Final magnetic design and conceptual mechanical design completed in P1*
- *MS56- Magnets constructed and tested - Current planned delivery August 2023*
- *MS56 currently ~3 months behind original schedule due to delays in ordering permanent magnet and thermal shunt material associated with ongoing budget discussions around high material costs*
- *D11.3 -"Prototype adjustable PM quadrupole and combined function magnets" - Current planned delivery end of August 2023*

Relevance of objectives and impact

- *Task 11.3 is still on track to manufacture and test a prototype permanent magnet based combined function magnet with coils for field trimming and tuning.*
- *Nominal power dissipation from trim coils ~ 1W (nominal power consumption of equivalent electromagnet from electrical resistance ~2.56 kW).*
- *Magnetic measurements of constructed prototype will demonstrate if permanent magnets can achieve the same field quality requirements as electromagnets and hence can be used to replace electromagnets in storage rings to reduce the power consumption of facilities.*



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Thank you for your attention!

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