Development of the beam diagnostics for the IFMIF accelerator

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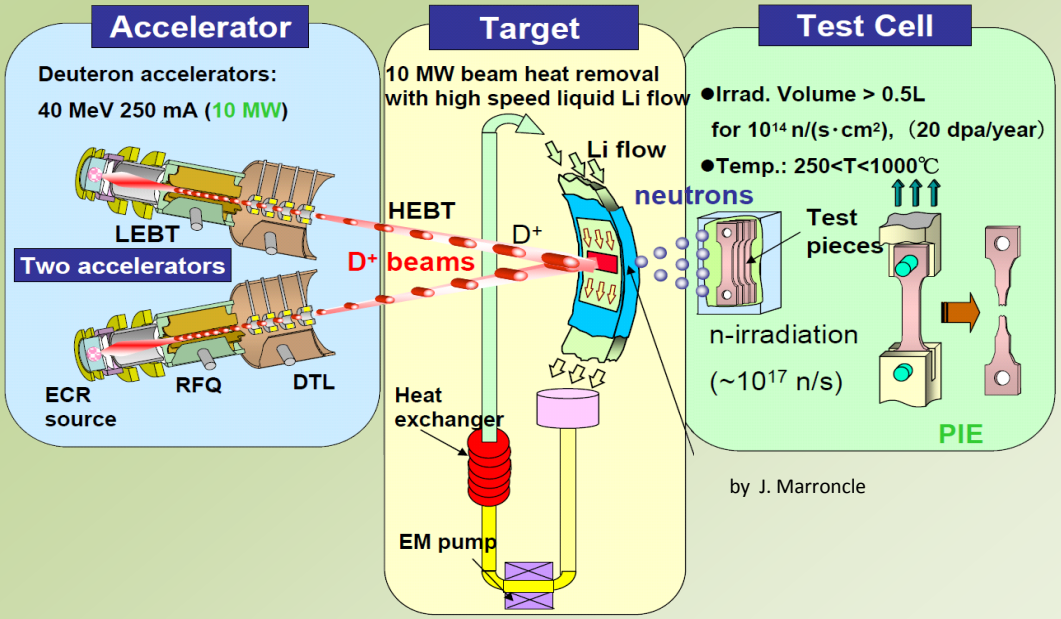
energie atomique • energies alternatives

What is IFMIF ?

❖ *IFMIF* : *I*nternational *F*usion *M*aterials *I*rradiation *F*acility

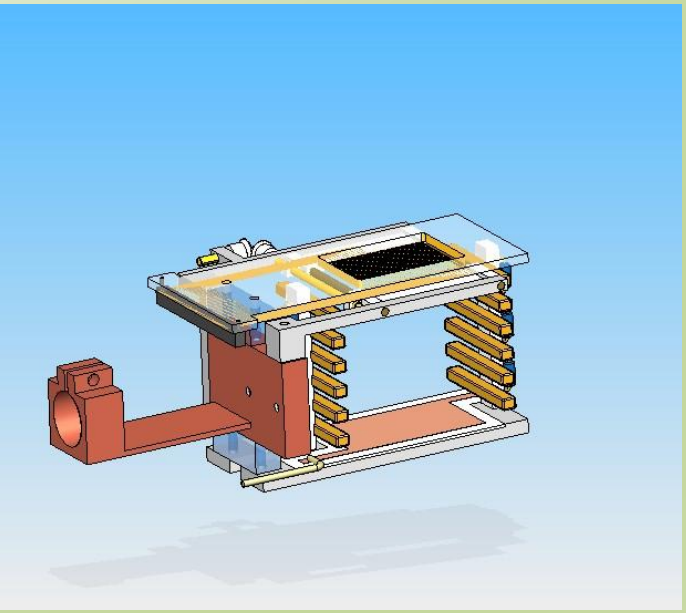
❖ Characteristics of *IFMIF* accelerator:

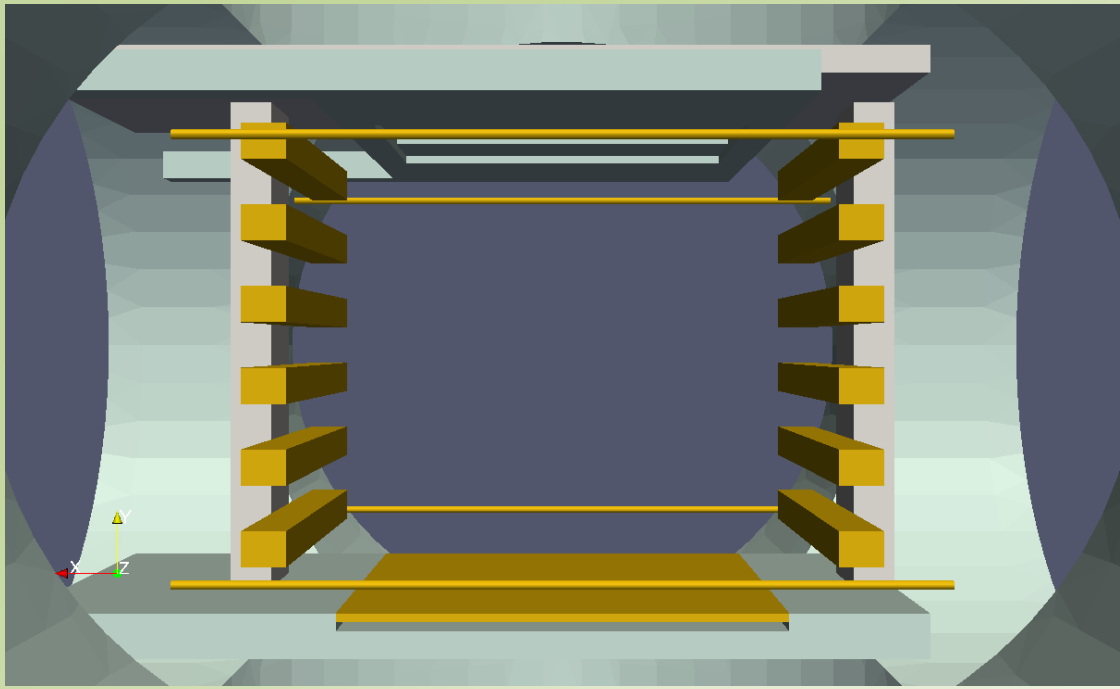
- E = 40 MeV
- $I_{deuteron}$ = 2 x 125mA (cw)
- P = 10 MW



Residual Gas Ionisation Beam Profile Monitor

- 6 degrader pairs generate electric field of ca. 100 kV/m
- 32 strips collecting ionisation electrons
- Sliding windows to limit effective area on strips



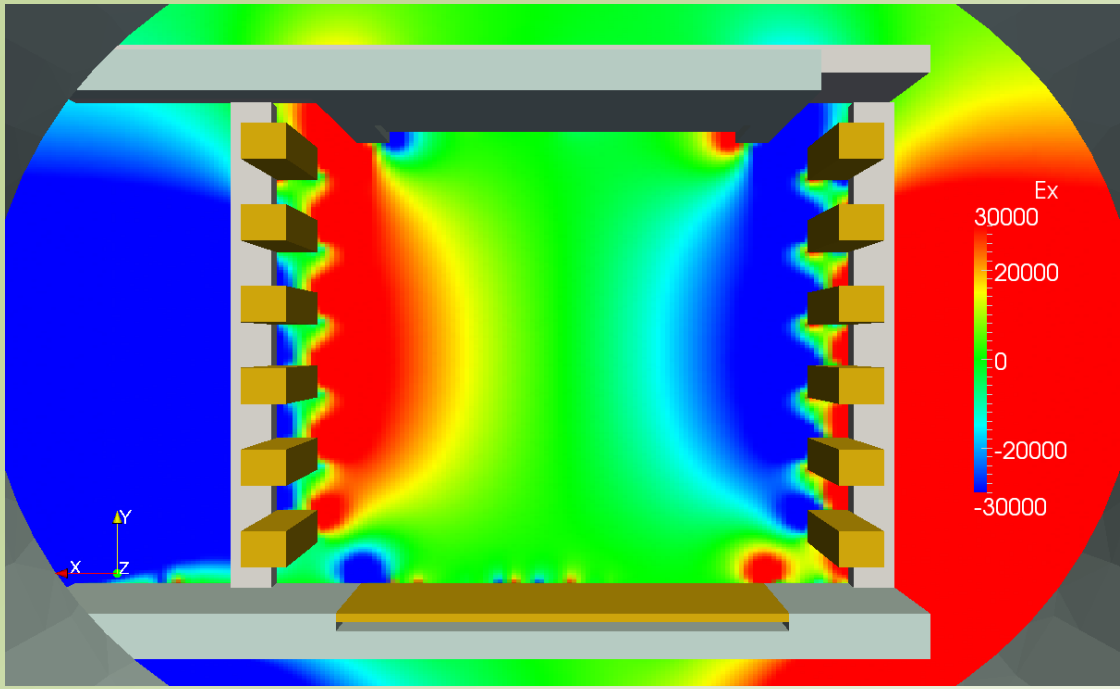


Electric Field Homogeneity

- Central detector plane perpendicular to the beam
- Vertical electric field component in color

<u>Original detector design:</u>

Electric fields within ± 30 kV/m



Electric Field Homogeneity

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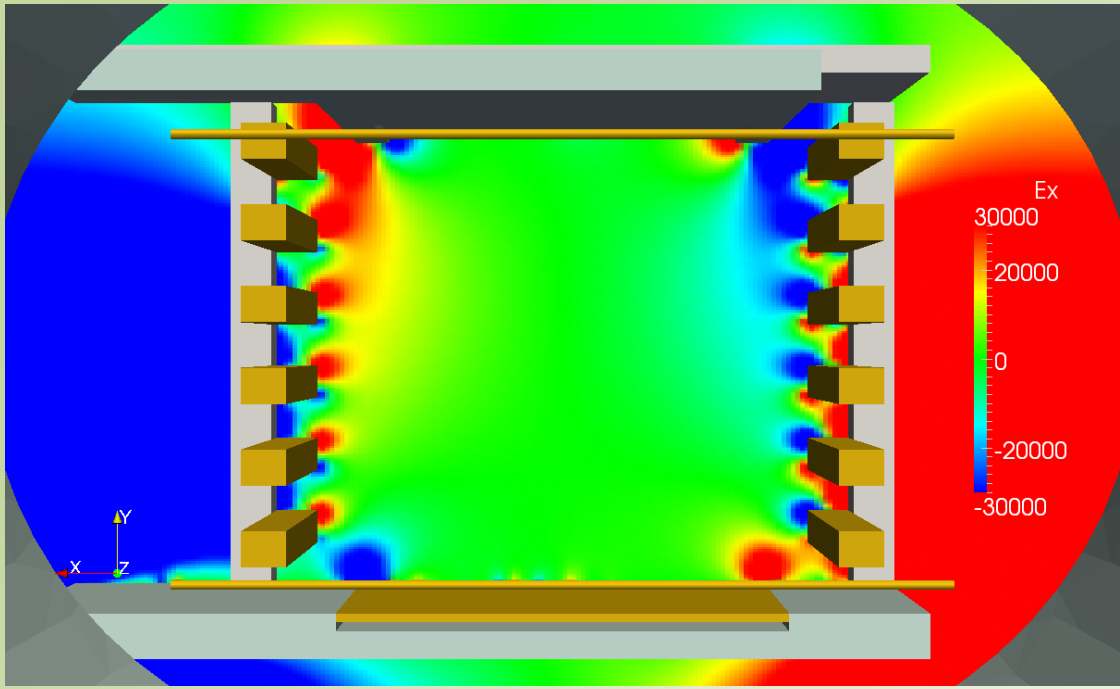
- Vertical electric field component in color

<u>Wire attachment:</u>

Electric fields within ± 10 kV/m



Electric Field Homogeneity

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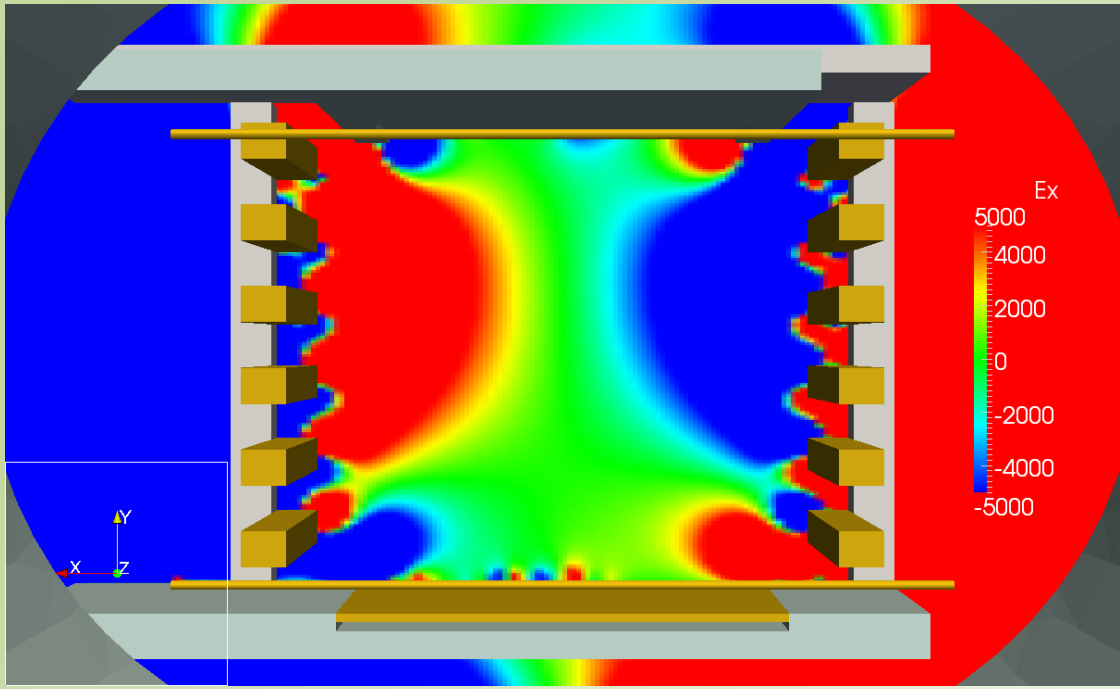
- Vertical electric field component in color

<u>Wire attachment:</u>

Electric fields within ± 10 kV/m

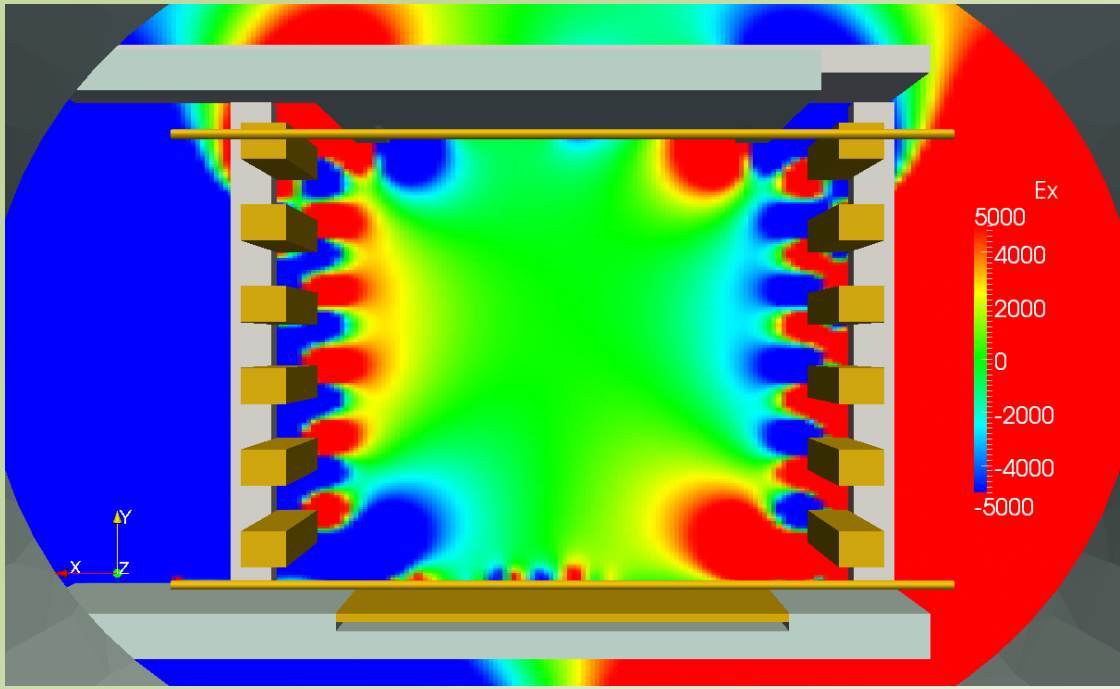


Electric Field Homogeneity

- Central detector plane perpendicular to the beam
- Vertical electric field component in color

<u>Original detector design:</u>

Electric fields within ± 3 kV/m



Conclusion & Outlook

Wire attachment & degrader voltage optimisation

⇒ Electric field homogeneity improved by one order of magnitude

Test measurements at GSI in April and May

Implementation of beam, residual gas, ionisation particles, SEM-electrons, etc.