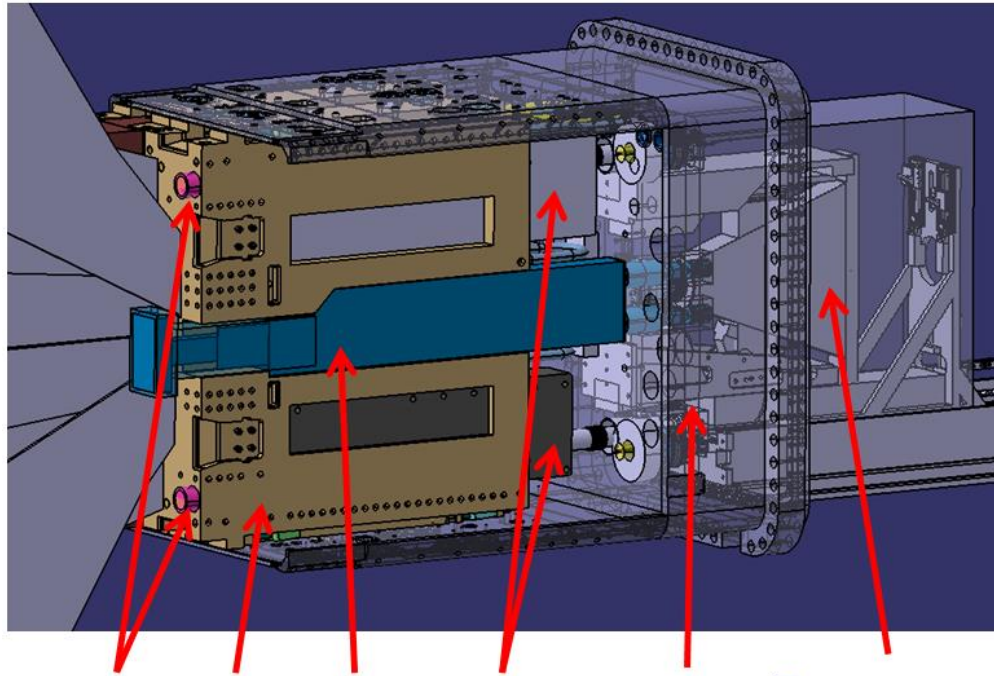


Progress on Design and R&D of ITER Diagnostic-Radial X-ray Camera



HXM DSM GDC In-camera Flange Ex-camera & shielding

Design: during preliminary design phase, great progress has been made.

- Structure design: the structure design is optimized and installation process is studied considering the simplification and easiness of maintenance.
- Remote handling skills and tools are designed for the system maintenance after being activated.
- Detector cooling: a dedicated gas cooling system using heat exchanger is designed to cool detector against high environment temperature which can be up to 240°C.
- Detector nuclear shielding: by putting B4C material in the front part of DSM and around detectors for neutron shielding, the detectors are expected to survive the whole D-D phase.
- Electronics: preliminary design of highly integrated pre-amplifier and program controllable mid-amplifier has been completed, both with bandwidth greater than 100 kHz to meet time resolution requirement of 20 kHz.
- Shielding cabinet: shielding cabinet for port cell electronics capable of attenuating neutron flux down to 0.0001 and gamma dose 0.01 is designed.

R&D: Based on EAST tokamak and technical experience from diagnostics development acquired on it, many R&D has been done to support the preliminary design.

- The tests of pre-amplifier and mid-amplifier indicated the electronics had no functional problem when debugging together and generally passed preliminary Electro Magnetic Compatibility (EMC) test and nuclear test. The highly-integrated compact pre-amplifier has been used in EAST and proved useful.
- To test the feasibility of dedicated gas cooling system for detectors, a cooling test platform was built and preliminary cooling test has been done, indicating that during 250°C baking the detector temperature is promising to be cooled down to the detector temperature limit of 75°C.
- To increase signal to noise ratio, large area detector with dark current less than 2nA has been manufactured and worked steadily in EAST experiments.