

# Select Diagnostic Upgrades and Installations

**Thomson Scattering:** 2D divertor expansion & fiber optics-based light collection in closed divertor geometry (UP11.00029 & UP11.00030)

**Electron Cyclotron Heating Stray Wave Detector**

**Ion Cyclotron Emission:** probe coverage expansion to measure polarity and mode number in high MHz range magnetic fluctuations

**Filterscopes:** improved signal to noise with optics & filters replacement

**(New) Upper View Bolometers:** coverage of entire upper divertor

**(New) Lyman-alpha Profiles:** high-field and low-field side arrays to determine neutral density profiles (NP11.00104)

**Cross-polarization Scattering:** in-vessel adjustable mirrors (NP11.00099)

**Microwave Imaging Reflectometry:** new "system-on-chip" transmitter and chip receiver modules for 2D density profiles (TP11.00153)

**(New) Fast Ion D-alpha Spectroscopy:** 2D imaging of fast ion population

**Electron Cyclotron Emission Imaging:** new system-on-chip receiver modules for 2D electron temperature profiles (UP11.00055)

**(New) Imaging Neutral Particle Analyzer:** phase-space sensitivity focused on trapped orbit part of distribution (NP11.00109)

**(New) Infrared Calibration Heated Tile:** 600 °C

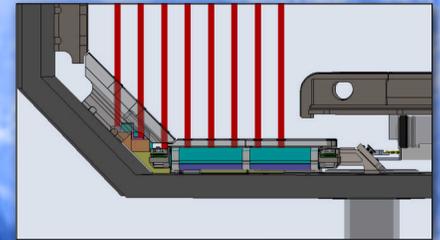
**Langmuir Probes:** expanded Small Angle Slot divertor coverage for detachment studies

**Charge Exchange Recombination Spectroscopy:** Additional high-field side toroidal views for improved measurement of poloidal asymmetry of angular rotation

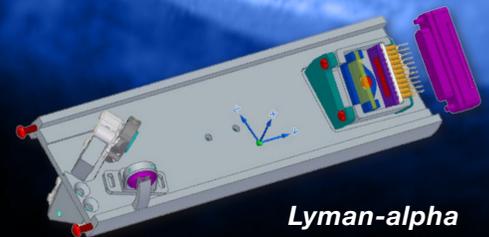
**Midplane Reciprocating Probe:** redesigned probe head and control system Magnetics: redesigned electronics for improved signal resolution

**Surface Eroding Thermocouples:** expanded Small Angle Slot divertor coverage for detachment studies (UP11.00033)

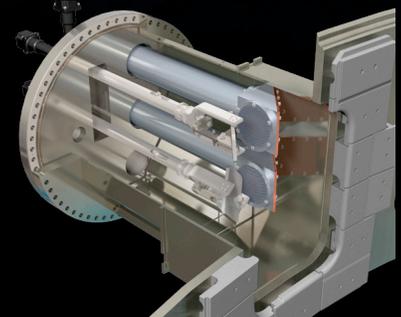
**Neutron Detectors:** new counter system using field-programmable gate arrays provides increased sensitivity



*Thomson Scattering*



*Lyman-alpha Profiles*



*Cross-polarization Scattering*



*Midplane Reciprocating Probe*



*Ion Cyclotron Emission*