LLNL collaboration on MAST-U

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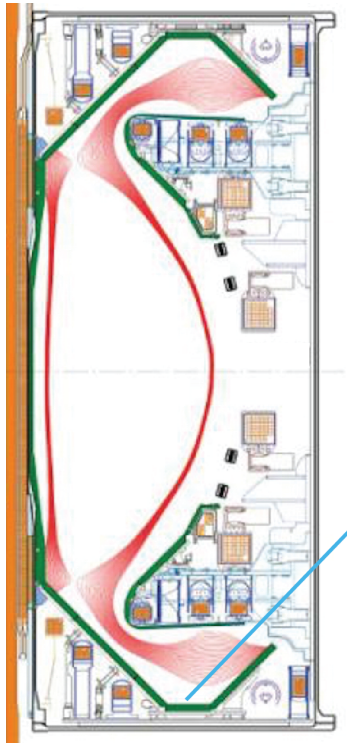
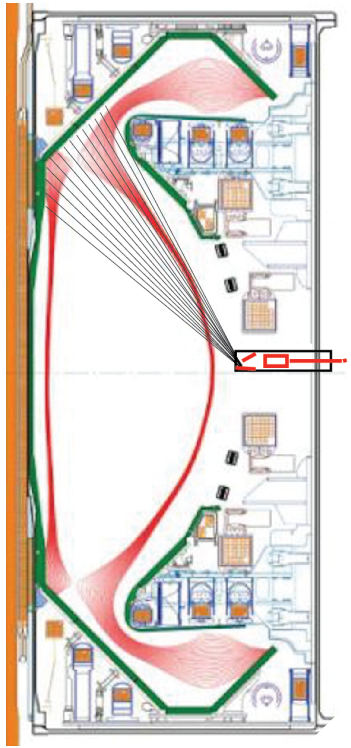
LLNL is developing a new collaboration with MAST-U in advanced divertor physics and divertor spectroscopy

- **Research Goals:**
  - **Support MAST-U Objective 1 on development of novel exhaust concepts**
    - Contribute to Super-X, snowflake and standard divertor physics studies and comparisons via measurements, analysis and modeling of power and momentum balances during attached and detached phases between and during ELMs
  - **Support MAST-U Objective 2 on contribution to the knowledge base for ITER**
    - Contribute to divertor detachment physics studies via measurements, analysis and modeling of impurity radiation and volumetric recombination distributions, impurity ionization balance, plasma opacity, divertor electron temperatures and densities, radiation and recombination front dynamics between and during ELMs
  - **Support MAST-U Objective 3 on feasibility assessment of the spherical tokamak as a fusion Component Test Facility**
    - Contribute to model validation and experiment based understanding of divertor transport and radiation in spherical tokamak geometry with emphasis on spherical tokamak physics effects, and advanced divertor configurations

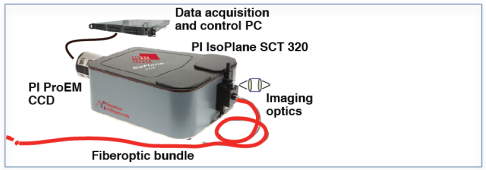
Divertor SPRED and divertor imaging UV-VIS spectrometer in support of advanced divertor studies



- SPRED VUV spectrometer for Super-X divertor studies
  - Carbon ionization balance between and during ELMs
  - Deuterium ionization / recombination balance, rate and T_e from Lyman series; Opacity
  - Divertor T_e from C III, C IV line ratios
    - Real-time for divertor control
    - Deviation from Maxwellian EEDF
  - Improved divertor P_{rad} analysis
  - Radiative divertor impurity radiation (CD_4, N_2, Ne, Ar)
  - Code benchmarking



- Imaging spectrometer for standard and advanced divertor configuration studies (strike points, X-point)
  - C II, C III, C IV line emission profiles



  - Volumetric recombination rate and profile from Balmer line R/YBs
  - MARFE dynamics, T_e, n_e
  - T_e from Balmer line series and photorecombination continuum
  - n_e from Balmer line Stark broadening at low T_e
  - Code benchmarking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