NOVA PHOTONICS

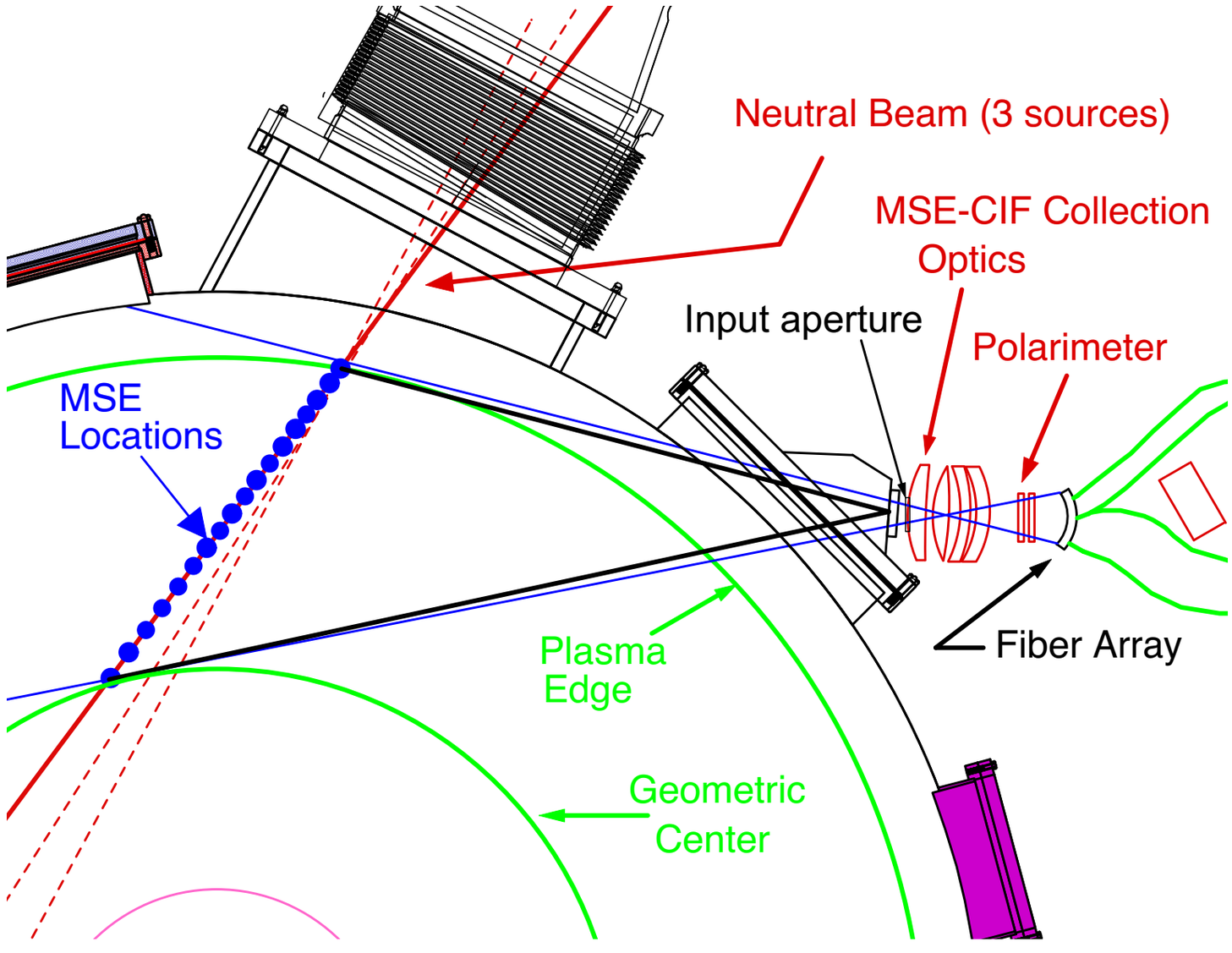
Fred M. Levinton, Darrell DiCicco, Matt Galante, and Ilker Uzun-Kaymak

The Motional Stark Effect Diagnostic for NSTX-U, Planned Research & Diagnostic Activities

March 8, 2021

MSE-CIF Diagnostic

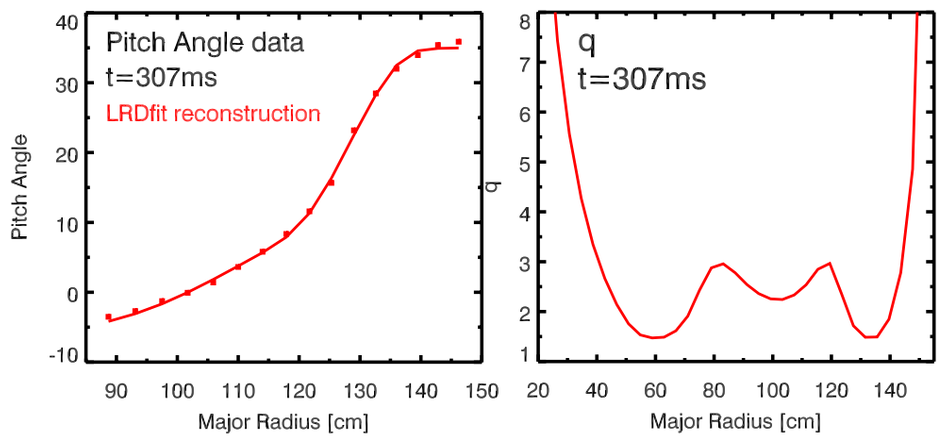
18 sightlines viewing in midplane, from geometric center to outboard edge.

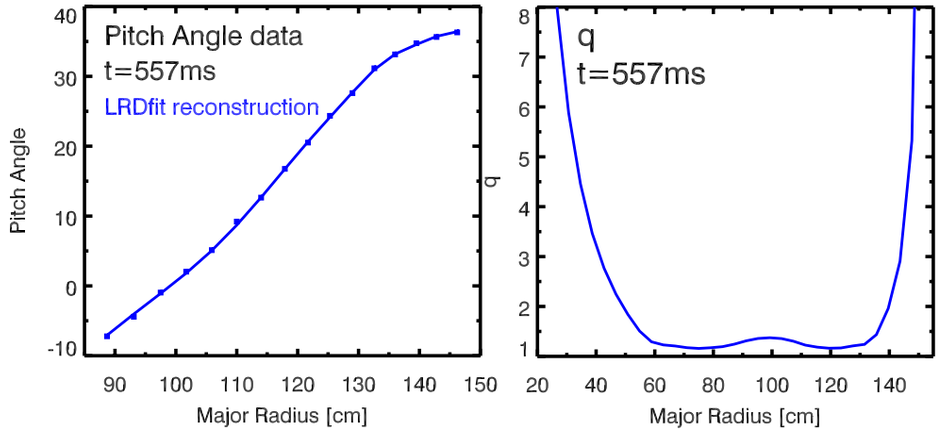


Collaboration Tasks

Task 1: Provide calibrated magnetic field pitch angle profiles for the NSTX-U project.

- Prior to calibration and operation, check out and re-start MSE-CIF system.
- Utilize equilibrium reconstruction code (LRDFIT) to provide the current and q-profiles.
- Supports Objectives 1 & 2 in NSTX-U Five Year Plan.





Collaboration Tasks

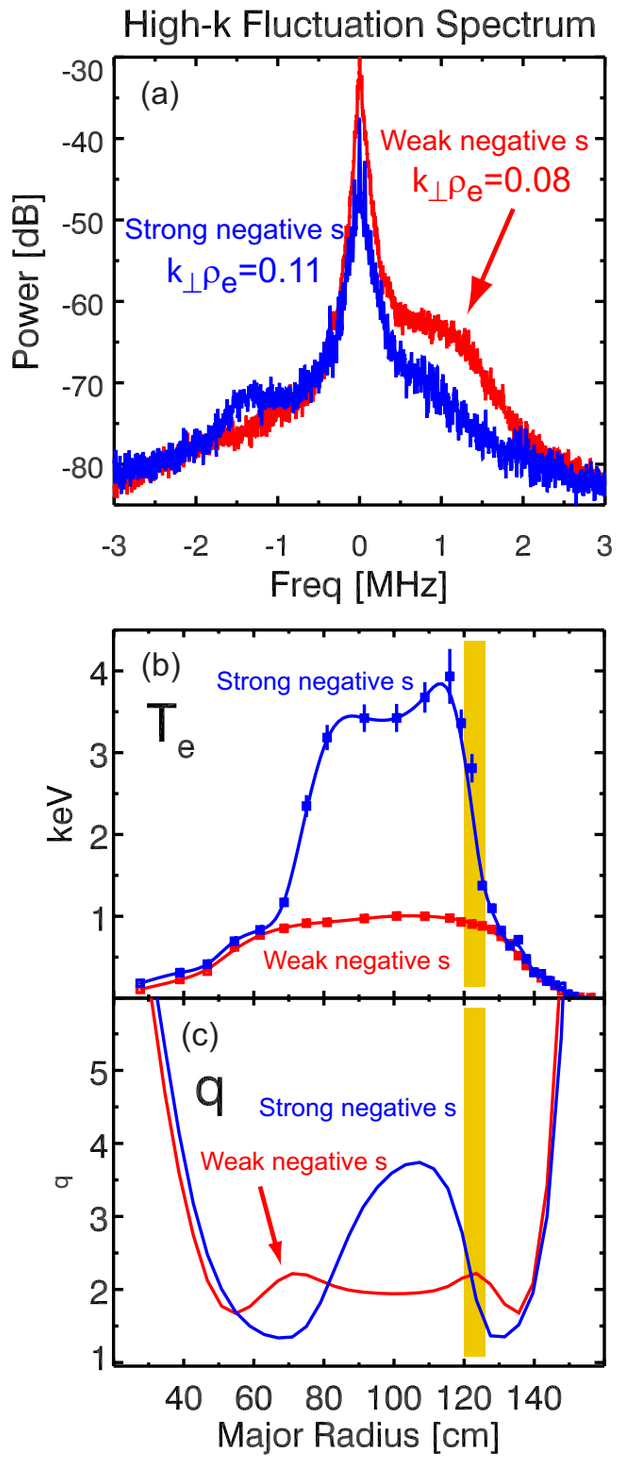
Task 2: Real-time MSE rt(MSE) measurement of magnetic field pitch angle profile.

- High performance real-time OS.
- Low latency propagation of MSE data to NSTX-U Plasma Control System (PCS).
- We are working with NSTX-U staff on implementation.
- Supports Objectives 2 in NSTX-U Five Year Plan.

Collaboration Tasks

Task 3: Reversed magnetic shear transport studies in NSTX-U

- Study of reversed magnetic shear transport in L-mode and H-mode plasmas.
- Develop simulation framework using TRANSP with various modules for modeling target plasmas with a range of q-profiles.
- Supports Objectives 1 in NSTX-U Five Year Plan.



Schedule and Key Needs or Requirements

- Re-start of MSE-CIF work requires on-site access, which is limited due to Covid-19.
- Some material/vendor delays for procurements.
- Current estimate for availability of MSE-CIF is mid-2022.
- RT-MSE is making good progress. We have had several discussions with PPPL staff. Testing of hardware is in process.
- RT-MSE availability is estimated to be in FY2023.
- Reversed shear studies under separate grant that will start 9/1/2021.
- We anticipate a key need/issue will be hiring additional staff (Physicist, Engineer) in late 2021/early 2022.