

# Feasibility Study of High-Flux FRC Formation via Spheromak Merging for C-2W Experiments

Topic Area:  
Experimental  
Capabilities

Partner	Company
PPPL	TAE Technologies
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## Project Summary:

The project aimed to utilize the MRX device at PPPL to study high magnetic-flux FRC plasma formation via counter-helicity spheromak merging, which may allow TAE to incorporate as a new FRC formation scheme in C-2W. We designed and developed a new mid-sized magnetized coaxial plasma gun\* (MCPG) which can produce a high magnetic-flux spheromak. The initial test was conducted at TAE's test facility, after which the experimental campaign in MRX was primarily carried out under very stringent safety rules at PPPL.

*\*A paper to be submitted to a scientific journal*

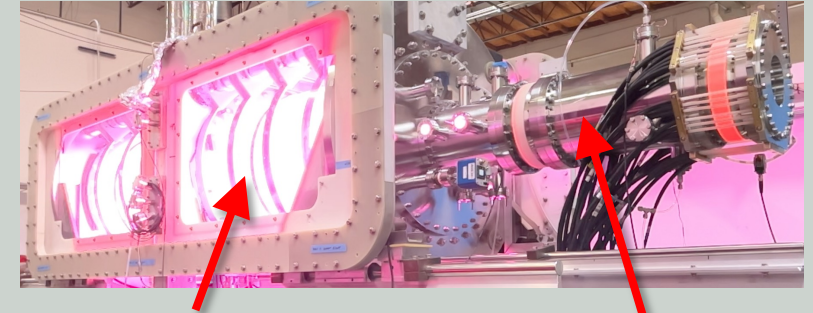
## Fusion Impact:

It may simplify the design of FRC fusion reactor by replacing the conventional high-voltage pulsed-power-based field-reversed theta-pinch FRC formation scheme with this new spheromak-merging scheme, which can be considered as an engineering risk mitigation. This MCPG system alone can also be used as a particle refueling and a refluxing tool in fusion devices.

## Business/Market Impact:

It could significantly reduce the cost of the FRC formation sections with mid-sized plasma guns.

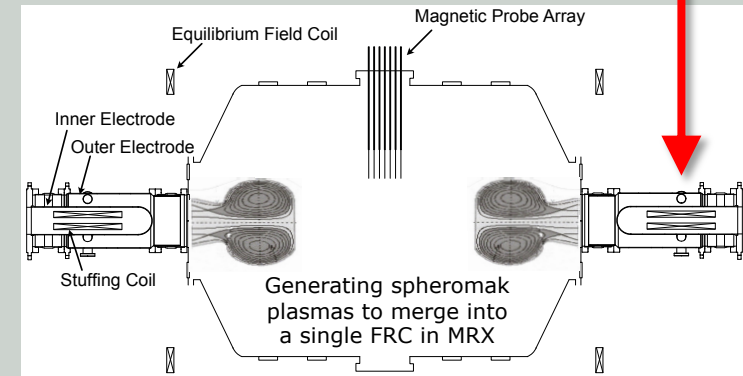
Test Stand  
at TAE



Initial test / plasma discharge

Developed MCPG\*

MRX Device  
at PPPL



**Period of  
Performance:**

2021-2023

**Federal Share:**

\$250,000

**Cost Share:**

\$70,000