

# Proposed Research Plan for Intensity Frontier Fellowship

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I am a founding member of the Mu2e experiment at Fermilab and have been Co-spokesperson since its inception in 2008. Additionally I am serving in the role of Project L3 manager for the Stopping Target and the Stopping Target Monitor. I have provided leadership and direct contributions to many aspects of the Collaboration, including policies, meeting and collaboration organization, background simulations, and detector and beam line designs.

Mu2e is in the construction phase for most areas of the Project. The Stopping Target support scheme has been developed and integration engineering with the surrounding structure is under way. One of the first T1 milestones in Mu2e is the completion of the Stopping Target, now scheduled for April 2020. It is important that I be at Fermilab over the coming year, pushing to make sure that we meet this important deadline.

We are in the process of developing the final designs for the Stopping Target Monitor system. I am leading that effort, with contributions from Purdue, Liverpool, UCL, Fermilab, and Manchester. Three postdocs, Nam Tran and Yaqian Wang from BU and Sophie Middleton from Manchester, are in residence at Fermilab. They are beginning to work with the Mu2e TDAQ team to establish data communications, specifications for the FPGA programming, data formatting and time stamping for the STM. They will work with an engineer at UCL who will be doing the FPGA programming. They will also begin development of online monitoring and slow controls. Wang is finishing up the simulations of backgrounds and data rates that inform the design of the STM collimators and shielding. Purdue is designing the detector shield house with regular visits to Fermilab to consult with the integration teams. The Manchester postdoc at Fermilab is working with engineers in the UK to develop the shielding. I am playing the leading oversight role in all of these tasks; they require my direct involvement on-site at Fermilab.

I have played a significant role in the simulations of backgrounds that have guided the design of Mu2e. I will continue to help to establish simulation priorities, something that is best accomplished when at Fermilab. I regularly participate by zoom in overall muon beamline integration, however this falls far short of in-person interactions. I expect in the future to be a major contributor to the Mu2e transition from Project to Operations. This is a crucial period in the development of the Stopping Target, Stopping Target Monitor, overall integration issues, and the last vestiges of simulations that affect the design of the experiment. Telephone connections and occasional trips to Fermilab are now inadequate to the tasks at hand. It is extremely important that I relocate to Fermilab during this critical period.

Although I have not had a lot of time to spend on Muon g-2, I was a member of the Brookhaven g-2 experiment, and as a consequence I've been able to make some useful suggestions and contributions based on the Brookhaven experience, and I will be serving as a reviewer of the analyses of the precession frequency.

BU has three postdocs in residence at Fermilab, splitting their time evenly between Mu2e and Muon g-2. At this stage of Mu2e, when we are in the building phase, I need to work with them on a daily basis that would only be possible if I were at Fermilab.

I will be on sabbatical for the 2019-2020 academic year. If my application for support is successful, I expect to be in residence at Fermilab during the period May 2019-September 2020, working 90% of my time on Mu2e and 10% on Muon g-2.