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To the Intensity Frontier Fellowship Selection Committee,

I am applying for the Intensity Frontier Fellowship award. I am Daniel Cronin-Hennessy, professor of physics at the University of Minnesota. I am starting my eleventh year as faculty and this year I will be taking my first sabbatical leave from teaching duties. The focus of my sabbatical leave will be to increase significantly my involvement in the Mu2e experiment based at Fermilab. Over the last decade I have dedicated a large fraction of my research effort to the design and construction of the NOvA experiment, which is also based at Fermilab. This experiment is now in stable operation and the first iteration of publications is imminent. I will remain an active member of the NOvA for the foreseeable future and a presence at Fermilab has advantages for that work as well.

I am extremely enthusiastic about the prospects of the Mu2e experiment. In many ways it is a golden path to new physics. I believe that Fermilab has chosen wisely to invest in the physics accessible from an intense muon source. The nearly four orders of magnitude increase in sensitivity is astounding and creates a very real possibility to see beyond the standard model. Translated to a mass scale the reach of this experiment is very far above the LHC direct production scale.

My two areas of intended contribution cover hardware and software. I have completed negotiating intended areas of contribution from Minnesota with the Mu2e collaboration leaders and have been officially admitted into the collaboration. Currently I have 1.5 postdocs committed to this experiment with one based at Fermilab. I have one graduate student working at Minnesota. Our hardware contributions focus on furthering the design of the high precision straw tube tracker. In this work we have also been advancing the fabrication tools and procedures. We are responsible for partial fabrication and testing of the straw detector during construction. If funded I will be at Fermilab during the version 2 prototyping for the straw tracker panel. Contributing to the panel development at Fermilab will allow me and my personnel to develop the technical expertise required for our fabrication and quality assurance responsibilities.

I also desire to open a new direction of contribution to the experiment during the sabbatical. After exchanges with spoke, Doug Glenzinski, and Fermilab Scientist, Rob Kutschke, I have become aware of several areas in offline and simulation that could use additional effort. These include improving the sophistication of calorimeter hit simulation which currently lacks a true electronic response model and cross-talk. I have developed such code for my past work on cathodes in the CLEO experiment. The detector simulation currently uses ideal geometry and from my past experience I have found that employing realistic geometry is better done early in the phase of an experiment.