

## Summary of proposal

Dr Alex Keshavarzi

*Department of Physics and Astronomy, University of Mississippi, P.O. Box 1848, University, MS 38677  
The Muon  $g - 2$  Experiment, Fermilab*

The future of Muon  $g - 2$ , both experimentally and theoretically, is a crucial and exciting period which I will contribute to in a significant capacity. In particular, leading the remaining upgrade of the kicker system for the Muon  $g - 2$  experiment is of paramount importance. The overall statistics and systematics goals of the experiment both rely on the remaining work needed to improve the characteristics of the kicker pulse. This will require my presence at Fermilab until the end of 2019 and is the key incentive for my application to be supported by an Intensity Frontier Fellowship. This will also include continued maintenance of the kicker system in my role as kicker coordinator and shared ring operations coordinator for the current FY19 (Run-2) period and beyond.

In addition to this, my other responsibilities include establishing an approach to correctly combining the many values of the anomalous precession frequency of the stored muons  $\omega_a$  from the different analysis groups and data sets, the fast rotation analysis of the stored beam to understand systematic effects due to beam dynamics and the supervision of University of Mississippi Ph.D. student Meghna Bhattacharya who is based at Fermilab. The latter will yield a full  $\omega_a$  analysis that will contribute to the published results of all remaining data taking runs of the Muon  $g - 2$  experiment and a complementary analysis to improve current limits on the potential violation of CPT and Lorentz invariance. In addition, over this time, I will contribute to the publication of the upcoming Muon  $g - 2$  theory initiative white paper and continue to update values for the Standard Model prediction of the muon  $g-2$ , the running of the QED coupling constant and the strong coupling constant. This fellowship will support me in all these endeavours and, crucially, allow me to make further positive contributions to particle physics at the Intensity Frontier at Fermilab.