Project Description - Studying the Kinematics of Lepton Jets

There are compelling physics motivations to consider the possibility of highly collimated groups of leptons: so-called “lepton jets”. In particular, the presence of a massive photon in the dark sector (see Stanford Rotation Projects in Heavy Photon Search) would explain some anomalies in the dark matter data and give rise to these event topologies. While the study of lepton jets has previously focused primarily on the topology of these events, the kinematics of these events may provide a powerful lever in identifying them, understanding key backgrounds and distinguishing among the models should a signal be observed.

The SLAC group has developed an analysis framework for studying lepton jets topologies that may be extended to a more detailed study of the kinematics of these events. The first task is the use of this framework to study simple kinematic quantities for signal samples and key backgrounds. As the key variables are established and understood, the next task will be to combine them with the topological analysis strategy in a way that improves the sensitivity and robustness of the lepton jets analysis.

Please contact Tim Nelson for more information regarding this project.