

The University of Colorado
Department of Physics
High Energy Physics Group

March 19, 2018

Dear Profs. Alysia Marino, Eric D. Zimmerman

It recently came to my attention that the high energy physics group at your Institution has an opening for a postdoctoral research associate. I would like to apply for the position.

I received my Ph.D. in experimental neutrino physics from the University of Hawaii at Manoa in April, 2016. During my graduate studies, I worked on event track reconstruction and particle ID techniques in KamLAND (Kamioka Liquid Scintillator Antineutrino Detector), a monolithic liquid scintillator neutrino detector in Kamioka, Japan. Through my work, I single handedly opened the doors to a never before explored capability of scintillator detectors to conduct indirect dark matter searches by looking for directional neutrino signals from the core of the Sun and Earth. According to my understanding, my work is the first ever physics application of directional neutrino reconstruction in scintillator. A paper for this is currently under preparation.

Nevertheless, topological event reconstruction in scintillator is fundamentally limited because the reconstruction is done using the smeared information of isotropically emitted scintillation photons collected by photomultiplier tubes (PMTs) along the perimeter of the detector volume. Liquid Argon Time-Projection-Chamber (LArTPC) technology that will be used by the DUNE (Deep Underground Neutrino Experiment) detector at Sanford Lab is the next generation endeavor to employ topological event imaging at an unprecedented level of precision, using the ability to drift ionization charge to a read-out plane. Although there has been much effort to demonstrate the feasibility of the detector technology itself, development of reliable event imaging algorithms will be crucial to the success of DUNE. I believe that my experience with topological event imaging in an extremely difficult medium, such as scintillator, puts me in a unique position to play a leading role in the effort to develop reliable reconstruction algorithms in LArTPCs.

In conclusion, my innovative endeavors in topological neutrino event reconstruction, as well as experience being involved in the commissioning phase of two experiments, makes me a unique candidate to apply for your position. I believe I can make a significant impact to your team of academic and scientific prowess at The University of Colorado.

Thank you for your consideration.

Best wishes,

Michinari Sakai

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