University of California, Irvine   February 11, 2018
Department of Physics and Astronomy
4129 Frederick Reines Hall
Irvine, CA 92697-4575

Dear Professor Hank Sobel,

It recently came to my attention that your institution has an opening for an Assistant Professor level position in experiment neutrino physics at your department. 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 a directional signal of neutrinos from the core of the Sun and Earth. According to my understanding, my work is the first ever physics application of directional neutrino detection in scintillator. A paper for this is currently under preparation.

I am currently working as a post-doctoral researcher at the University of California, Los Angeles (UCLA) with the CUORE (Cryogenic Underground Observatory for Rare Events) $0\nu\beta\beta$ experiment at LNGS (Laboratori Nazionali del Gran Sasso), Italy. CUORE is an unprecedented tonne-scale bolometric search for lepton number violation in ^{130}Te. The experiment was successfully upgraded last year increasing its detector mass by a factor of almost 20. A paper of our first $0\nu\beta\beta$ analysis with this increased mass was submitted for publication to PRL in late 2017. (https://arxiv.org/abs/1710.07988).

The sensitivity of CUORE is expected to start probing the inverted neutrino mass hierarchy phase space of the effective Majorana neutrino mass within the next 5 years of data taking. However, In order to advance further, we are confronted with the challenge of further reducing our background in the region of interest by more than 2 orders of magnitude below the current level of $\sim 0.01\,\mathrm{count/keV/kg/yr}$. I am currently spearheading the effort on precision modeling of the alpha background spectrum to better understand our radioactive backgrounds to meet this challenge.

In addition, throughout my academic career, I have been heavily involved in teaching and mentoring students. My philosophy for teaching is summarized in two steps: to cultivating a self motivated drive through curiosity, and mastering through iteration. This method has proven successful during both my experiences teaching at the undergraduate level at University of Hawaii as well as mentoring Ph.D. level students at University of California, Los Angeles (UCLA).

In conclusion, my innovative endeavors in developing novel neutrino detection techniques, and pushing the limits of background reduction in ultra-pure radioactive contamination environments for $0\nu\beta\beta$ decay experiments, as well as my experience in successfully teaching/mentoring students at both the undergraduate and graduate levels, 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 UCI.

Thank you for your consideration.

Best wishes,

Michinari Sakai

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