

EDUCATION

PhD, Experimental Neutrino Physics

2016

GPA: 4.0/4.0, University of Hawaii at Manoa

Dissertation: High Energy Neutrino Analysis at KamLAND and Application to Dark Matter Search

Double BS, Physics and Mathematics

2005

GPA: 4.3/4.5, Sun Moon University, S. Korea

President's Award 2005, Award for Outstanding Academic Achievement – Samsung Corp.

LEADERSHIP AND RESEARCH

KAMLAND (KAMIOKA LIQUID SCINTILLATOR ANTINEUTRINO DETECTOR)

2009 - 2016

Research Assistant, University of Hawaii at Manoa

- Spearheaded development of novel directional neutrino detection technique in scintillator and demonstrated with data that this can be used to conduct dark matter searches in scintillator, first ever physics application of neutrino directionally in scintillator
- Led unprecedented particle ID capability studies in scintillator using track profile reconstruction techniques using never before observed T2K events spilling into KamLAND
- Was solely responsible for high energy ($\gtrsim 1\,\mathrm{GeV}$) energy calibration using cosmic ray muons and applying this to neutrino analysis for the first time

MINI-TIMECUBE (WORLD'S SMALLEST PORTABLE NEUTRINO DETECTOR)

2009 - 2016

Research Assistant, University of Hawaii at Manoa

- Led development of Geant4 detector simulation with team of 3 undergraduate students to conducted case studies for various neutron capture doping agents. Simulation results were used to guide overall detector design
- Was responsible for background studies associated with long lived cosmogenic isotopes 8He/9Li, to quantitatively
 determine effect on detector live time

CUORE (CRYOGENIC UNDERGROUND OBSERVATORY FOR RARE EVENTS)

Apr. 2016 - Current

Post-doctoral Scholar, University of California, Los Angeles (UCLA)

- Spearheading development of precision alpha background modeling in collaboration with a graduate student with goal for further background reduction to cover inverted neutrino mass hierarchy of $0\nu\beta\beta$ decay in 130 Te
- Mentored and worked with 2 undergraduate students for investigation of shielding structures to mitigate γ and beta backgrounds for next generation $0\nu\beta\beta$ decay searches requiring ultra-low background levels

TEACHING EXPERIENCE

Mentor, UCLA 2016 - Current

- Taught weekly Geant4 simulation tutorials to 3 PhD students and 3 undergraduate students for 1 semester, students are now able to take on simulation tasks and collaborate in the group
- Led weekly Physics paper discussion groups for 3 PhD students, and promoted team work to increase dialogue and productivity within team

Teaching Assistant, University of Hawaii at Manoa

2007 - 2009

- Planned classwork and taught 2 weekly undergraduate Physics Laboratory classes of over 20 students each for 3 semesters, received "excellent" reviews
- Mentored undergraduate students in undergraduate Physics classwork for 2 hours each week for 3 semesters, got students repeatedly seeking my particular tutoring

SKILLS

Human Languages: English (native), Japanese/Korean (trilingual proficiency)
Programming Languages: Proficient in C, C++, Python, Fortran, Mathematica, Bash

Software/Tools: ROOT, GEANT4, PADS, AUTOCAD

Invited Talks and Presentations

• Division of Nuclear Physics, Pittsburgh/Carnegie Mellon University Talk: CUORE AND BACKGROUND REDUCTION CASE STUDIES FOR CUPID	Oct 2017
• Conference on Science at SURF, South Dakota	May 2017
Invited talk: Status of the CUORE $0\nu\beta\beta$ Decay Search	
• Fermilab - Frontiers of Liquid Scintillator Technology	Mar 2016
Invited talk: Particle ID and event reconstruction algorithms in scintillator	
• DOE project review, Honolulu, Hawaii	Jul 2015
Talk: High Energy Analysis and Application to Dark Matter Search in Kamland	
• Neutrino, Kyoto, Japan	Jun 2012
Poster: Indirect Dark-Matter Detection Through Kamland	
• University of Hawaii Campus Open-house	Nov 2010, 2011
Talks: What is a Neutrino?, mini-TimeCube: The World's Smallest Neutrino Detec-	
TOR	
• Applied Antineutrino Physics, Sendai, Japan	Aug 2010
Talk: MINI-TIMECUBE: A PORTABLE DIRECTIONAL NEUTRINO DETECTOR	
• DOE project review, Honolulu, Hawaii	Sep 2009
Talk: Kamland Summary	
• Fermilab - International Neutrino Summer School	Jul 2009
Talk: Student presentation: How to solve θ_{23} degeneracy	

Publications

- [1] S. Abe et al. Measurement of the 8B Solar Neutrino Flux with the KamLAND Liquid Scintillator Detector. *Phys. Rev.*, C84:035804, 2011.
- [2] C. Alduino et al. First Results from CUORE: A Search for Lepton Number Violation via $0\nu\beta\beta$ Decay of ¹³⁰Te. 2017.
- [3] K. Asakura et al. Search for the proton decay mode $p \to \overline{\nu}K^+$ with KamLAND. Phys. Rev., D92(5):052006, 2015.
- [4] K. Asakura et al. Study of electron anti-neutrinos associated with gamma-ray bursts using KamLAND. Astrophys. J., 806(1):87, 2015.
- [5] K. Asakura et al. KamLAND Sensitivity to Neutrinos from Pre-Supernova Stars. Astrophys. J., 818(1):91, 2016.
- [6] T. I. Banks et al. A compact ultra-clean system for deploying radioactive sources inside the KamLAND detector. *Nucl. Instrum. Meth.*, A769:88–96, 2015.
- [7] A. Gando et al. ⁷Be Solar Neutrino Measurement with KamLAND. Phys. Rev., C92(5):055808, 2015.
- [8] A. Gando et al. Search for electron antineutrinos associated with gravitational wave events GW150914 and GW151226 using KamLAND. Astrophys. J., 829(2):L34, 2016.
- [9] Jason Kumar, John G. Learned, Michinari Sakai, and Stefanie Smith. Dark Matter Detection With Electron Neutrinos in Liquid Scintillation Detectors. *Phys. Rev.*, D84:036007, 2011.
- [10] C. Lane et al. A new type of Neutrino Detector for Sterile Neutrino Search at Nuclear Reactors and Nuclear Nonproliferation Applications. 2015.
- [11] V. A. Li et al. Invited Article: miniTimeCube. Rev. Sci. Instrum., 87(2):021301, 2016.