Shih-Kai Lin

Postdoctoral Researcher

2247 Oakridge Dr Apt 1
Aurora, IL, 60502
+1 (864) 349 5588
Shihkai.Lin@colostate.edu
shihkailin

Education

Sept. 2014 **Doctor of Philosophy in Physics**, *University of Houston*, Houston, TX.

2003–2005 **Master of Science in Physics**, *National Taiwan University*, Taipei, Taiwan.

1996–2001 **Bachelor of Science in Computer Science**, *National Taiwan University*, Taipei, Taiwan.

Doctoral Dissertation

title *Neutron Production by Cosmic Ray Muons*

supervisors Kwong Lau

description Neutrons produced by cosmic ray muons are a background of underground experiments. Understanding neutron yield is particularly important for future low background experiments. In this work mechanisms of neutron production by muons are discussed and neutron yield is measured with data from Daya Bay Reactor Neutrino Experiment.

Experience

2014–present **Postdoctoral Researcher**, *Colorado State University*, Fort Collins, CO.

Member of the NOvA and the 35-ton prototype collaboration at Fermi National Accelerator Laboratory.

- Software manager for the NOvA Data Driven Trigger (DDT) system, a subsystem of the NOvA Data Acquisition (DAQ) system.
- Measuring muon antineutrino charged-current inclusive cross section with the NOvA near detector.
- Developed the control application for the LBNE calibration module for photon detector, which was used in 35-ton prototype's data taking.
- Photon detector R&D and performance study.

2009–2014 **Research Assistant**, *University of Houston*, Houston, TX.

Member of particle physics group and Daya Bay Reactor Neutrino Experiment. Actively participated in the muon detector system QC/QA, installation, commissioning, operation, and data analysis.

- Analyzed data for neutron production by cosmic ray muons.
- Developed a reconstruction algorithm to reconstruct the incident position and the track of cosmic ray muons.
- Designed and built a small resistive plate chamber for monitoring the gas composition.
- Experience in operating radioactive sources such as ^{137}Cs, ^{90}Sr and ^{60}Co for resistive plate chamber response study.
- Designed and built a collimator for shielding and collimating ^{60}Co.
- Monte Carlo simulation on photoelectron production by photons and electron transport in Bakelite.
- Developed a web based 3D muon event display with WebGL and MySQL technology.
- During hardware installation, led a team of technicians to route 400 electronic cables from a 10m deep pool to the electronics control room in a week.

2005–2008 **Research Assistant**, *Academia Sinica*, Taipei, Taiwan.

Joined Taiwan Experiment on Neutrino(TEXONO) group and worked on high purity Germanium detector response to different particles, energy calibration and data analysis.

- Analyzed data used for dark matter exclusion plots.
- Calibrated the Ge detector with ^{137}Cs, ^{60}Co, ^{55}Fe, ^{32}P, etc.
- Maintained the Ge detector located 28m away from the core of No.1 reactor of Kuo-Sheng Nuclear Power Station.
- Utilizing pulse shape discrimination(PSD) technique to lower detector threshold.
- Developed an algorithm utilizing Fast Fourier Transform spectra to reject near-threshold detector noise.

2003–2005 **Research Assistant**, *National Taiwan University*, Taipei, Taiwan.

Joined semiconductor group and worked on electron transport properties of Indium Gallium Nitride.

- Measured and published a paper on the transport properties of Indium Gallium Nitride.
- Extensive experience in high vacuum and low temperature experiments.

2001–2003 **Lieutenant**, *Mandatory Military Service*.

Maintained and developed a windows application for database management of parts of radio equipment with Borland Delphi.

Teaching

2004 **Teaching Assistant**, *National Taiwan University*, Taipei, Taiwan.

Responsible for grading, solving and answering questions about University Physics homework problems for about 50 students.

Honors and Professional Memberships

Nov 2016 Fermi National Accelerator Laboratory Fall 2016 NPC Scholars

Nov 2015 The 2016 Breakthrough Prize in Fundamental Physics

Mar 2013 American Physical Society

Nov 2009 Golden Key International Honour Society

2005 Government Fellowship for Studying Abroad from Ministry of Education, Taiwan

Conference Talks

Apr 2013 Shih-Kai Lin, "A Geometric Method for Measuring Muon Induced Neutrons at Daya Bay", APS April Meeting 2013

Languages

Chinese Native

English Fluent

Computer Skills

Language C/C++, MS Visual C++ 4.0, Borland Delphi, HTML, Python, Bash, SQL, JavaScript, PHP, AJAX, LaTeX

Software MySQL, SQLite, phpMyAdmin, Apache, Squid, Origin, MATLAB

System Windows, Linux (both Debian and Red Hat based)

Publications

2017 (NOvA Collaboration), "Constraints on oscillation parameters from ν_e appearance and ν_μ disappearance in NOvA", *Physical Review Letters* 118 (23), 231801

2017 (NOvA Collaboration), "Measurement of the Neutrino Mixing Angle θ_{23} in NOvA", *Physical Review Letters* 118 (15), 151802

2017 (Daya Bay Collaboration), "Measurement of electron antineutrino oscillation based on 1230 days of operation of the Daya Bay experiment", *Physical Review D* 95 (7), 072006

2017 (Daya Bay Collaboration), "Improved measurement of the reactor antineutrino flux and spectrum at Daya Bay", *Chinese Physics C* 41 (1), 013002

2016 (Daya Bay Collaboration and MINOS Collaboration), "Limits on active to sterile neutrino oscillations from disappearance searches in the MINOS, Daya Bay, and Bugey-3 experiments", *Physical Review Letters* 117 (15), 151801

2016 (Daya Bay Collaboration), "Improved search for a light sterile neutrino with the full configuration of the Daya Bay experiment", *Physical Review Letters* 117 (15), 151802

2016 (Daya Bay Collaboration), "New measurement of θ_{13} via neutron capture on hydrogen at Daya Bay", *Physical Review D* 93 (7), 072011

2016 (Daya Bay Collaboration), "The detector system of the Daya Bay reactor neutrino experiment", *Nuclear Instruments and Methods in Physics Research A* 811 (2016) 133-161

2016 (Daya Bay Collaboration), "Measurement of the Reactor Antineutrino Flux and Spectrum at Daya Bay", *Phys. Rev. Lett.* 116, 061801 (2016)

2015 (Daya Bay Collaboration), "New Measurement of Antineutrino Oscillation with the Full Detector Configuration at Daya Bay", *Phys. Rev. Lett.* 115, 111802 (2015)

2015 (Ken Chow, John Cummings, Emily Edwards, William Edwards, Ry Ely, Matthew Hoff, Logan Lebanowski , Bo Li, Piyi Li, ***Shih-Kai Lin***, Dawei Liu, Jinchang Liu, Kam-Biu Luk, Jiayuan Miao, Jim Napolitano, Juan Pedro Ochoa-Ricoux, Jen-Chieh Peng, Ming Qi, Herbert Steiner, Paul Stoler, Mary Stuart, Lingyu Wang, Changgen Yang, Weili Zhong), "Waterproofed photomultiplier tube assemblies for the Daya Bay reactor neutrino experiment", *Nuclear Instruments and Methods in Physics Research A* 794 (2015) 25-32

2015 (Daya Bay Collaboration), "The muon system of the Daya Bay Reactor antineutrino experiment", *Nuclear Instruments and Methods in Physics Research A* 773 (2015) 8-20

2013 Z. Ning, Q.M. Zhang, J.L. Xu, L. Lebanowski, J.W. Zhang, C.G. Yang, M. He, J. Zhao, J.H. Zou, V. Pěč, ***Sh.-K. Lin***, M.Y. Guan, H.F. Hao, L. Zheng, X.L. Ji, F. Li, K. Lau and V. Vorobel, "Calibration algorithms of RPC detectors at Daya Bay Neutrino Experiment", *JINST* 8 (2013) T03007

2013 (Daya Bay Collaboration), âĂIJImproved measurement of electron antineutrino disappearance at Daya BayâĂİ, *Chinese Phys. C* Vol. 37, No. 1 (2013) 011001

2012 (Daya Bay Collaboration), âĂIJObservation of electron-antineutrino disappearance at Daya BayâĂİ, *Phys. Rev. Lett.* 108, 171803 (2012)

2012 (Daya Bay Collaboration), âĂIJA side-by-side comparison of Daya Bay antineutrino detectorsâĂİ, *Nucl. Instr. Meth A* 685, 78-97 (2012)

2011 XU Ji-Lei, GUAN Meng-Yun, YANG Chang-Gen, WANG Yi-Fang, ZHANG Jia-Wen, LU Chang-Guo, Kirk McDonald, Robert Hackenburg, Kwong Lau, Logan Lebanowski, Cullen Newsom, ***Lin Shih-Kai***, Jonathan Link, MA Lie-Hua, Viktor Pěč, Vit Vorobel, CHEN Jin, LIU Jin-Chang, ZHOU Yong-Zhao, LIANG Hao, "Design and preliminary test results of Daya Bay RPC modules", *Chinese Phys. C* 35(9): 844-850

2011 Liehua Ma, Logan Lebanowski, Jin Chen, Mengyun Guan, Robert Hackenburg, Kwong Lau, ***Shih-Kai Lin***, Changguo Lu, Kirk McDonald, Cullen Newsom, Zhe Ning, Viktor Pec, Sen Qian, Vit Vorobel, Yifang Wang, Jilei Xu, Changgen Yang, Jiawen Zhang, Qingmin Zhang, âĂIJThe mass production and quality control of RPCs for the Daya Bay experimentâĂİ, *Nuclear Instruments and Methods in Physics Research A* 659 (2011) 154âĂŞ160

2010 M. Deniz, S.T. Lin, V. Singh, J. Li, H.T. Wong, S. Bilmis, C.Y. Chang, H.M. Chang, W.C. Chang, C.P. Chen, M.H. Chou, K.J. Dong, J.M. Fang, C.H. Hu, G.C. Jon, W.S. Kuo, W.P. Lai, F.S. Lee, S.C. Lee, H.B. Li, H.Y. Liao, C.W. Lin, F.K. Lin, ***S.K. Lin***, Y. Liu, J.F. Qiu, M. Serin, H.Y. Sheng, L. Singh, R.F. Su, W.S. Tong, J.J. Wang, P.L. Wang, S.C. Wu, S.W. Yang, C.X. Yu, Q. Yue, M. Zeyrek, D.X. Zhao, Z.Y. Zhou, Y.F. Zhu, and B.A. Zhuang, "Measurement of $\bar{\nu}_e$-elelctron cross section with a CsI(Tl) scintillating crystal array at the Kuo-Sheng nuclear power reactor", *Phys. Rev. D* 81, 072001 (2010)

2009 S.T. Lin, H.B. Li, X. Li, ***S.K. Lin***, H.T. Wong, M. Deniz, B.B. Fang, D. He, J. Li, C.W. Lin, F.K. Lin, V. Singh, X.C. Ruan, J.J. Wang, Y.R. Wang, S.C. Wu, Q. Yue, and Z.Y. Zhou, âĂIJNew limits on spin-independent and spin-dependent couplings of low-mass WIMP dark matter with a germanium detector at a threshold of 220 eVâĂİ, *Phys. Rev. D* 79:061101, 2009

2008 H Y Liao, H M Chang, M H Chou, M Deniz, H X Huang, F S Lee, H B Li, J Li, C W Lin, F K Lin, ***S K Lin***, S T Lin, V Singh, H T Wong and S C Wu, "Production and decay of the ^{73}Ge*(1/2$^-$) metastable state in a low-background germanium detector", *J. Phys. G: Nucl. Part. Phys.* 35 (2008) 077001

2007 H. T. Wong, H. B. Li, S. T. Lin, F. S. Lee, V. Singh, S. C. Wu, C.Y. Chang, H. M. Chang, C. P. Chen, M. H. Chou, M. Deniz, J. M. Fang, C. H. Hu, H. X. Huang, G. C. Jon, W. S. Kuo, W. P. Lai, S. C. Lee, J. Li, H.Y. Liao, F. K. Lin, ***S. K. Lin***, J. Q. Lu, H.Y. Sheng, R. F. Su, W. S. Tong, B. Xin, T. R. Yeh, Q. Yue, Z.Y. Zhou, and B. A. Zhuang, âĂIJSearch of Neutrino Magnetic Moments with a High-Purity Germanium Detector at the Kuo-Sheng Nuclear Power StationâĂİ, *Phys. Rev. D* 75:012001, 2007

2005 ***Shih-Kai Lin***, Kun-Ta Wu, Chao-Ping Huang, C.-T. Liang, Y. H. Chang, Y. F. Chen, P. H. Chang, N.C. Chen, H. C. Peng, C. F. Shih, K. S. Liu and T. Y. Lin, "Electron Transport in In-rich $In_xGa_{1-x}N$ films", *Journal of Applied Physics* 97, 046101 (2005)