

# Shih-Kai Lin

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## 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.
  - 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  $^{137}\text{Cs}$ ,  $^{90}\text{Sr}$  and  $^{60}\text{Co}$  for resistive plate chamber response study.
  - Designed and built a collimator for shielding and collimating  $^{60}\text{Co}$ .

- 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  $^{137}\text{Cs}$ ,  $^{60}\text{Co}$ ,  $^{55}\text{Fe}$ ,  $^{32}\text{P}$ , 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

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## Computer Skills

Language	C/C++, MS VISUAL C++ 4.0, BORLAND DELPHI, HTML, PYTHON, BASH, SQL, JAVASCRIPT, PHP, AJAX, $\text{\LaTeX}$
Software	MYSQL, SQLITE, PHPMYADMIN, APACHE, SQUID, ORIGIN, MATLAB
System	WINDOWS, LINUX (both DEBIAN and RED HAT based)

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## Publications

- 2017 (NOvA Collaboration), “Constraints on oscillation parameters from  $\nu_e$  appearance and  $\nu_\mu$  disappearance in NOvA”, *Physical Review Letters* 118 (23), 231801
- 2017 (NOvA Collaboration), “Measurement of the Neutrino Mixing Angle  $\theta_{23}$  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  $\theta_{13}$  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, Piya 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), “Improved measurement of electron antineutrino disappearance at Daya Bay”, *Chinese Phys. C* Vol. 37, No. 1 (2013) 011001
- 2012 (Daya Bay Collaboration), “Observation of electron-antineutrino disappearance at Daya Bay”, *Phys. Rev. Lett.* 108, 171803 (2012)
- 2012 (Daya Bay Collaboration), “A side-by-side comparison of Daya Bay antineutrino detectors”, *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, “The mass production and quality control of RPCs for the Daya Bay experiment”, *Nuclear Instruments and Methods in Physics Research A* 659 (2011) 154-160
- 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  $\bar{\nu}_e$ -electron 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, “New limits on spin-independent and spin-dependent couplings of low-mass WIMP dark matter with a germanium detector at a threshold of 220 eV”, *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  $^{73}\text{Ge}^*(1/2^-)$  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, “Search of Neutrino Magnetic Moments with a High-Purity Germanium Detector at the Kuo-Sheng Nuclear Power Station”, *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  $\text{In}_x\text{Ga}_{1-x}\text{N}$  films", *Journal of Applied Physics* 97, 046101 (2005)