

Complete Vitae

Last update: 2/13/2015
(*new** for changes in last 2 yrs)

Name: Chii-Dong Lin

**Title: University Distinguished Professor
Associate Director of the J. R. Macdonald Laboratory
Department of Physics, Kansas State University, Manhattan, KS 66502**

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Education:

- Ph. D. University of Chicago, 1974
- B. S. National Taiwan University, 1969

Experience:

- University Distinguished Professor, 1990-present
- Center Fellow, National Center of Theoretical Sciences, Taiwan January-July 2004
- JILA-University of Colorado visiting fellow May-November 1995
- Visiting Professor, National Chiao-Tung University, Taiwan, Jan-July 1996
- Visiting Professor, National Taiwan University, Jan. 1987-July 1987
- Argonne Visiting Scientist, Sept. 1986-Jan. 1987
- Professor, Kansas State University, 1984-Present
- Associate Professor, Kansas State University, 1980-1984
- Assistant Professor, Kansas State University, 1976-1980
- Postdoctoral Fellow, Harvard University 1974-1976

Honors:

- A JSPS (Japan Society for the Promotion of Science) visiting Fellow (Oct 23-Dec.10, 2012)
- A FAST Fellow—named lecture series speaker at ETH, Switzerland (September 8-15, 2012)
- Named Top 150 scientists of Kansas by Ad Astra Kansas Initiative
- Olin Petefish award –Higuchi-KU endowment 2010
- Outstanding Referee of the American Physical Society 2009
- Distinguished Visiting Scholar, RIKEN, Japan, December 1995
- NORDITA FELLOWSHIP 1990 summer
- Fellow, American Physical Society, 1986
- SLOAN FELLOWSHIP, 1979-83

Committees of Professional Organizations (since 2000)

- Organizing Committee, International Conference on few-body systems, 2000
- DAMOP Fellowship Committee, 2001-2003
- ISIAC Program committee 2004
- HCI program committee 2006-2009
- ICOMP Program Committee 2008
- Chair, 2nd International Conference of Attosecond Physics, held in Manhattan, Kansas State University 2009
- DAMOP Executive Committee (elected) 2009-2012
- ICOMP Program Committee 2011-17
- Attosecond Conference Program Committee 2011-2016
- DAMOP Nomination Committee 2013-2015

*DAMOP: Division of Atomic, Molecular and Optical Physics of the American Physical Society

* ISIAC: International Seminar of Ion-Atom Collisions

* HCI: Highly Charged Ions Conference

* ICOMP: International Conference on Multiphoton Processes

Research Grants

Current support (about 600k/year) *new**

2014-2017 NSF-EPSCoR Track 2 Research Grant between Nebraska and Kansas State
(total \$6,000k for 3 years. My portion \$230k excluding Fringe and overhead)

2013-2016 CoPI with a grant via MIT, AFOSR (\$195k for 3 years –KSU portion)

2012-2015 Single P.I. DOE imaging grant (\$459,000 for 3 years)

2012-2015 DOE –JRM grant, Co-PI (my portion is \$280,000 per year)

Past support (since 2000)

2009-2012 Total (\$428k/year)

2006-2009 Total (\$478k/year)

DOE imaging grant \$148k

DOE-JRM grant \$280k

NSF \$50k

2005 DOE-JRM grant (\$280k)

2004 DOE-JRM grant (\$280k)

2003 DOE-JRM grant (\$280k)

2002 DOE-JRM grant (\$280k)

2001 DOE-JRM grant (\$290k)

2000 DOE-JRM grant (\$290k)

Research Expertise and Accomplishments

Short summary of important contributions

- Proposed a **new set of quantum numbers** for describing the correlation and classification of doubly excited states of atoms that have been adopted in the literature.
- Proposed a new set of quantum numbers describing triply excited states of atoms.
- One of the pioneers in using **hyperspherical coordinates** for studying three-body systems
- Leaders in theories of low-energy and medium-energy ion-atom collisions.
- Originator of the **molecular tunneling ionization theory** (MO-ADK) for intense laser-molecule interactions.
- Originator of **quantitative rescattering (QRS) theory** in strong field rescattering physics
- Originator of **laser-induced electron diffraction (LIED)** for dynamic imaging of molecules.

Expanded description:

1970-1976

During my PhD training under U. Fano, I investigated many-body effects in atomic photoionization and developed hyperspherical coordinates for studying doubly excited states of helium, following the footsteps initiated by J. Macek. As a postdoc, I worked with A. Dalgarno and Walter Johnson on relativistic Random-phase approximation to obtain accurate radiative transition rates and later photoionization cross sections for atoms.

1976-1986

In 1976 I was hired as a visiting Assistant Professor at Kansas State University. I began to look into charge transfer processes for collisions between energetic ions from accelerators with atoms. Later, multiply charged ions produced from other ion sources (ECR, EBIT) became available, and I was involved in developing the theory for collisions of such ions with atoms and molecules.

During this time period, I continued to pursue two-electron correlations in doubly excited states. The main point of this problem is that the conventional independent particle model (or Hartree-Fock theory) is unable to classify doubly excited states, thus a new set of quantum numbers are needed. The classification scheme was finally proposed in 1984. Today this classification scheme is nearly universally used by the atomic physics community.

1986-2002

During this period, I was involved in extending the classification schemes to triply excited states. We have succeeded in this effort, but there had been no experimental activities. In the meantime, I was involved in extending the hyperspherical coordinates from two-electron atoms to any three-body systems. This method treats any three-body systems on equal footing. The hyperspherical method has since been used in many areas, including three-body recombination and Efimov states in cold atoms physics, by Chris Greene, Brett Esry, and others, and by my group in low-energy atomic collisions, and positron-atom collisions.

2002-2013

Since 2002, my research has shifted completely to strong field physics, i.e., the study of atoms and molecules in an intense infrared laser. Kansas State University entered this area in 2001, including all the experimentalists and theorists in the DOE-supported J R Macdonald Laboratory. Since then, my group has made a number of important contributions. The first is the development of the tunneling ionization theory for molecules, called **MO-ADK** theory, published in 2002. This simple theory makes it possible to study strong field ionization of molecules. Our next major contribution is the development of the so-called quantitative rescattering (**QRS**) theory. The QRS was first reported in 2008. It has been extended to study high-order harmonic generation and in high-energy photoelectrons.

A consequence of the QRS is our proposal of using electrons generated from laser for imaging the structure of molecules. This laser-induced electron diffraction (**LIED**) can achieve sub-Angstrom spatial resolution and few-femtosecond temporal resolution. This was first demonstrated in 2012 in collaboration with Lou DiMauro's group and the result was reported in Nature.

Current research (2013-current) new*

*High-order harmonic generation with MIR lasers; (two PRL papers)
laser-induced electron diffraction from polyatomic molecules; (1 Nat. Comm. Paper)
waveform synthesis of harmonic enhancement; (1 Nat. Comm. Paper, one Sci. Rept paper)
characterization of attosecond pulses; (new project)
transient absorption with attosecond pulses in the laser field.
Molecular imaging from within with photoelectrons from inner shells. (new project)*

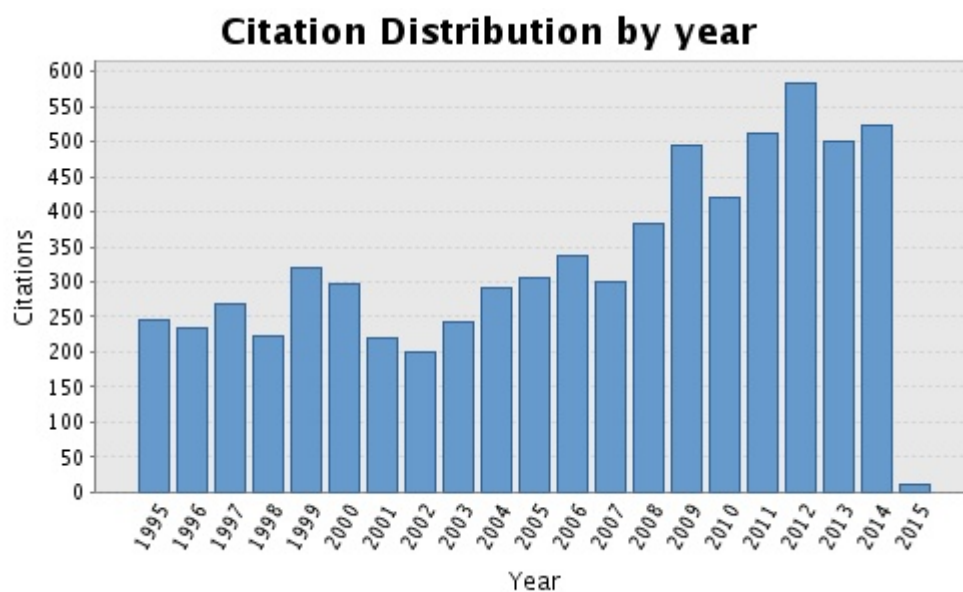
Citation Counts : From web of Science ([Data of 2/13/2015](#)) new*

Total number of papers published: 394

Total citations: 10127

H-index: 50

Average citations per item: 27.44



Citation Counts : According to Google Scholar *new**

Citation indices

	All	Since 2010
Citations	11996	3756
h-index	56	30
i10-index	246	94

Publications

Full Publication List in Refereed Journals, see
<http://www.phys.ksu.edu/personal/cdlin/papers/pubnow.html>

Top-cited articles (over 30 citations/yr for articles published after 2002) *new**

1. “Theory of molecular tunneling ionization”, XM Tong, ZX Zhao, CD Lin
Physical Review A 66 (3), 033402, (2002) [527 times](#)

2. “Accurate retrieval of structural information from laser-induced photoelectron and high-order harmonic spectra by few-cycle laser pulses”, T Morishita, AT Le, Z Chen, CD Lin, *Physical review letters* 100 (1), 013903 (2008) [221 times](#)
3. “Empirical formula for static field ionization rates of atoms and molecules by lasers in the barrier-suppression regime”, XM Tong, CD Lin, *Journal of Physics B*: 38 (15), 2593 (2005). [207 times](#)
4. “Quantitative rescattering theory for high-order harmonic generation from molecules” AT Le, RR Lucchese, S Tonzani, T Morishita, CD Lin , *Physical Review A* 80 (1), 013401 (2009) [164 times](#)
5. “ Strong-field rescattering physics—self-imaging of a molecule by its own electrons” CD Lin, AT Le, Z Chen, T Morishita, R Lucchese *Journal of Physics B*, 43 (12), 122001 (2010) [124 times](#)
6. “Imaging ultrafast molecular dynamics with laser-induced electron diffraction” CI Blaga, J Xu, P Agostini, L. DiMauro, C. D. Lin, *Nature* 483, 194 (2012) [102 times](#).

Publications from 2013 and 2014 (with links) *new**

2014

390. Cheng Jin, Guoli Wang, A. T. Le and C. D. Lin, “Route to Optimal Generation of keV High-Order Harmonics with Synthesized Two-Color Laser Fields”, **Scientific Repts**, 4, 7067 (2014). [link](#)

389. Qianguang Li, Xiao-Min Tong, Toru Morishita, Cheng Jin, Hui Wei, and C. D. Lin, “Rydberg states in strong field ionization of hydrogen by 800, 1200 and 1600 nm lasers”, *J. Phys. B* 47, 204019 (2014). [link](#)

388. Xu Wang, Cheng Jin and C. D. Lin, “Coherent control of high-harmonic generation using waveform synthesized chirped laser fields”, *Phys. Rev. A* 90, 023416 (2014). [link](#)

387. Junliang Xu, Cosmin Blaga, Kaikai Zhang, Y. H. Lai, C. D. Lin, Terry Miller, P. Agostini and L. DiMauro, “Diffraction using laser-driven broadband electron wave packets”, **Nature Communications**, 5, 4206 (2014) [link](#)

386. A.T. Le, Hui Wei, Cheng Jin, Vu Ngoc Tuoc, Toru Morishita and C. D. Lin, “Universality of returning electron wave packet in high-order harmonic generation with mid-infrared laser pulses”, **Phys. Rev. Lett.** 113, 033001 (2014) [link](#)

385. Cheng Jin, Guoli Wang, Hui Wei, Anh-Thu Le, C. D. Lin, “Waveforms for Optimal sub-keV High-Order Harmonics with Synthesized Two- or Three-Color Laser Fields”, **Nature Commu**, 5, 4003 (2014). [link](#) to journal

384. Wei-Chun Chu, Toru Morishita, and C. D. Lin, “Probing dipole-forbidden autoionizing states by isolated attosecond pulses”, *Phys. Rev. A* 89, 033427 (2014). [link](#)

383. Wei-Chun Chu, Toru Morishita and C. D. Lin, " Probing and controlling autoionization dynamics with attosecond light pulses in a strong dressing laser field", Chin. J. Phys. 52, 301 (2014). [link](#)

382. Qianguang Li, Xiao-Min Tong, Toru Morishita, Hui Wei, and C. D. Lin, "Fine structures in the intensity dependence of excitation and ionization probabilities of hydrogen atom in intense 800 nm laser pulses", Phys. Rev. A89, 023421 (2014).[link](#)

2013

381. A. T. Le, R. R. Lucchese and C. D. Lin, "high harmonic generation from molecular isomers with mid-infrared intense laser pulses", Phys. Rev. A88, 021402 (2013). [link](#)

380. Toru Morishita and C. D. Lin, "Photoelectron spectra and high Rydberg states of lithium generated by intense lasers in the over-the-barrier ionization regime", Phys. Rev. A87, 063405 (2013). [link](#)

379. A.-T. Le, R. R. Lucchese and C. D. Lin, "Quantitative rescattering theory of high-order harmonic generation for polyatomic molecules", Phys. Rev. A87, 063406 (2013). [link](#)

378. C. D. Lin and Wei-Chun Chu, "Controlling atomic line shapes", **Science**, 340, 694 (2013) [link](#)

377. Wei-Chun Chu and C. D. Lin, "Probing and controlling the autoionization dynamics with attosecond light pulses", in *Progress in Ultrafast Intense Laser science IX*. Ed K. Yamanouchi and K. Midorikawa, Springer 2013. [link](#)

376. Wei-Chun Chu and C. D. Lin, " Absorption and emission of single attosecond light pulses in an autoionizing gaseous medium dressed by a time-delayed control field", Phys. Rev. A87, 013415 (2013) [link](#)

375. M. C. H. Wong, A.-T. Le, A. F. Alharbi, A. E. Boguslavskiy, R. R. Lucchese, J.-P. Brichta, C. D. Lin, and V. R. Bhardwaj, "High harmonic spectroscopy of the Cooper Minimum in Molecules", **Phys. Rev. Lett.** 110, 033006 (2013) [link](#)

Books published:

Review of Fundamental Processes and Applications of Atoms and Ions, editor,
World Scientific, 1993

Review articles:

1. A. T. Le, Hui Wei, Cheng Jin and C. D. Lin, "Wavelength scaling of high-order harmonic generation with mid-infrared lasers", J. Phys. B (under preparation). **new***

2. C. D. Lin, A. T. Le, Z. J. Chen and Toru Morishita, " Strong field rescattering physics - Self Imaging of molecules by their own electrons", J. Physics B, Atomic, Molecular and Optical Physics, B43, 122001 (2010).

3. C. D. Lin "Hyperspherical coordinate approach to atomic and Coulombic three-body systems", Phys. Rept. 257, 1-83 (1995).
4. W. Fritsch and C. D. Lin " Theory of ion-atom collisions- Coupled Channel Methods," Phys. Rept. 202, 1-97 (1991)
5. C. D. Lin "Doubly excited states, including new classification schemes," Advances in Atomic Mol. Phys., Vol. 22, 77-142 (1986)
6. C. D. Lin and P. Richard "Inner-Shell Vacancy Production in Ion-Atom Collisions," Adv. in Atomic Mol. Physics, Vol. 17, p. 275-348, (1981).

Invited Talks, Seminars and Colloquia (2012-2014)

2014 Invited talks: *new**

Ultrafast Phenomena 2014, 7/7-11, Okinawa, Japn
 Optical Society of American (OSA) Frontiers in Optics, 10/19-22, Tucson, Arizona
 Strong Field Physics, Zhangjiajie, China 10/31-11/4
 Atomic Physics—slow electrons and short pulses, Dresden, Germany, 11/24-28
 ICOMP2013, Shanghai, China, 12/7-10
 Frontiers of attosecond physics and Sciences, Hsinchu, Taiwan 12/10-13

Seminars

3/5 KSU seminar
 5/16 ICFO, Barcelona, Spain
 5/20 ICFO, Barcelona, Spain
 11/5 Chinese Academy of Sciences, Beijing, China
 11/5 Institute of Applied Physics and Computational Mathematics, Beijing, China
 11/6 Peking University, Beijing, China

2013 Invited talks: *new**

5/17 Shantou University, China, workshop on strong laser physics'
 6/3 DAMOP annual meeting, Quebec City, Canada
 8/25 Spie Ultrafast Imaging, San Diego, California
 10/8 OSA-DLS Ultrafast Chemical Dynamics, Orland, FL

Seminars:

3/21: Harvard-ITAMP
 3/22: MIT-Kaetner's group
 4/3: KSU seminar
 5/13 SIOM (Shanghai Institute of Optics and fine Mechanics), Shanghai, China
 5/21 National defense university of science and technology, Changsha, China
 5/27 Wuhan Institute of Physics, Wuhan, China
 5/27 Huazong university of science and technology, Wuhan, China
 7/15 Max Planck Institute, Heidelberg, Germany
 7/18 Max Planck Institute, Erlangen, Germany

2012 Invited talks and colloquia

Gordon Conf for photoionization, Galveston, TX (2/12-17)

Gordon Conf for multiphoton ionization, Mt Holyoke, Mass (6/3-8)

Colloquium at Wayne State University (4/12-13)

Seminars:

National Taiwan University, (1/5/12)

National Tsinghua University (1/16/12)

Jagiellonian University, Krakow, Poland (9/5/12)

ETH, Zurich, Switzerland (ETH FAST Fellow) (9/11/12, two lectures)

ETH, Zurich, Switzerland (ETH FAST Fellow) (9/12/12, two lectures)

Institute of Atomic and Molecular Physics, Taipei, Taiwan (10/15/12)

Nagoya University, Nagoya, Japan (10/18/12)

Tohoku University, Sendai, Japan (11/29/12)

RIKEN, Tokyo, Japan (12/5/12)

Tokyo University, Sendai, Japan (12/6/2012)

University of Electro communications, Tokyo, Japan (12/7/2012)

National ChiaoTung University, Hsinchu, Taiwan (12/22/2012)

National Cheng-Kung University, Tainan, Taiwan (12/27/2012)