

Curriculum Vitae

Jin Yu 喻进

Complex System Research Division

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EDUCATION

- PhD: Physics University of Illinois at Urbana-Champaign (UIUC) Aug, 2007
Advisor: Professor Klaus Schulten
- MS: Finance UIUC May, 2007
- MS: Physics Tsinghua University (Beijing, China) Jan, 2001
Advisor: Professor Guozhen Wu 吴国祯
- BS: Physics Tsinghua University 清华大学物理系 June, 1998

PROFESSIONAL EMPLOYMENT

- Principle Investigator 特聘研究员, Complex System Research Division, CSRC, Chinese Academy of Engineering Physics 北京计算科学研究中心, 中国工程物理研究院 Dec 2011 – present
- Postdoc with Oster Group Molecular & Cellular Biology, and Bustamante Lab in Physics, University of California (UC), Berkeley Sept 2007 – Nov 2011
- Research assistant in Theoretical and Computational Biophysics Group, Beckman Institute, UIUC Jan 2003 – Aug 2007
- Teaching assistant in undergraduate Quantum Physics and graduate Quantum Mechanics, Department of Physics, UIUC Aug 2001- Dec 2002
- Research assistant in Molecular and Nano Sciences Laboratory, Department of Physics, Tsinghua University Aug 1998- Jan 2001

FUNDING AWARD

- National Natural Science Foundation of China (NSFC)
国家自然科学基金重点项目 (参与) co-PI Grant #11635002 2017-2021
国家自然科学基金面上项目 (主持) PI Grant #11775016 2018-2021
国家自然科学基金面上项目 (主持) PI Grant #11275022 2013-2016
- 1000-Talent Global Recruitment Program of China for Young Scholar
中组部国家青年千人计划 2012-2015
- Keystone Symposia Future of Science Fund Scholarship; Biophysical Society Annual Meeting CPOW Travel Award 2010-2011
- UC Berkeley Chancellor's Postdoctoral Fellowship, and Clare Boothe Luce Fellowship 2007-2010

PROFESSIONAL MEMBERSHIP

- US Biophysical Society Early Career Committee member since 2018
- Chinese Biophysical Society Single-molecule Biophysics Committee member
中国生物物理协会单分子生物分会理事 since 2015

PUBLICATIONS (* corresponding authorship)

30. Lin-Tai Da* and **Jin Yu**. Base-Flipping Dynamics from an Intrahelical to an Extrahelical State Exerted by Thymine DNA Glycosylase During DNA Repair Process. *Nucleic Acids Research in press* 2018

29. Chunhong Long and **Jin Yu***. Balancing Non-Equilibrium Driving with Nucleotide Selectivity at Kinetic Checkpoints in Polymerase Fidelity Control. *Entropy* 20, 306, 2018

28. Ilona Christy Unarta, Lizhe Zhu, Camen Ka Man Tse, Peter Pak-Hang Cheung, **Jin Yu**, and Xuhui Huang*. Molecular mechanism of RNA polymerase II transcription elongation elucidated by kinetic network models. *Current Opinion in Structural Biology* 49, 54-62, 2018

27. Lin-Tai Da*, Yi Shi, Guodong Ning, and **Jin Yu***. Dynamics of the excised base release in thymine DNA glycosylase during DNA repair process. *Nucleic Acids Research*, 46(2) 569-581, 2017

26. Liqiang Dai, Holger Flechsig, and **Jin Yu***. Deciphering intrinsic inter-subunit couplings that lead to sequential hydrolysis of F1-ATPase ring. *Biophysical Journal* 113 (7) 1440-1453, 2017

25. Lin-Tai Da^{†*}, Chao E[†], Yao Shuai, Shaogui Wu, Xiao-Dong Su, and **Jin Yu***. T7 RNA Polymerase Translocation is Facilitated by Helix Opening on the Fingers Domain that may also Prevent Backtracking. *Nucleic Acids Research* 45(13) 7909-7921, 2017 ^{†equal contribution}

24. Chuanbiao Zhang, **Jin Yu**, and Xin Zhou*. Imaging Metastable States and Transitions in Proteins by Trajectory Map. *The Journal of Physical Chemistry B*, 121(18) 4678-4686, 2017

23. Chao E, Baogen Duan, and **Jin Yu***. Nucleotide Selectivity at a Preinsertion Checkpoint of T7 RNA Polymerase Transcription Elongation. *The Journal of Physical Chemistry B*, 121(15) 3777-3786, 2017

22. **Jin Yu***. Computational investigations on polymerase actions in gene transcription and replication: Combining physical modeling and atomistic simulations. *Chinese Physics B*, 25 (1) 018706, 2016

21. Lin-Tai Da, Chao E, Baogen Duan, Chuanbiao Zhang, Xin Zhou, **Jin Yu***. A jump-from-cavity pyrophosphate ion release assisted by a key lysine residue in T7 RNA polymerase transcription elongation. *PLoS Computational Biology*, 11 (11), e1004624, 2015
20. Jianhua Xing*, **Jin Yu**, Hang Zhang, Xiaojun Tian. Computational modeling to elucidate molecular mechanisms of epigenetic memory. *Epigenetic Technological Applications In TRANSLATIONAL EPIGENETICS* by Elsevier. Chapter 12, 245-264, 2015
19. Bo Cheng, Shaogui Wu, Shixin Liu, Piere Rodriguez, **Jin Yu***, Shuxun Cui*. Protein denaturation at single-molecule level: the effect of nonpolar environments and its implications to the unfolding mechanism by proteases. *Nanoscale*, 7, 2970, 2015
18. **Jin Yu***, Lin-Tai Da, Xuhui Huang*. Constructing kinetic models to elucidate structural dynamics of a complete RNA polymerase II elongation cycle. *Physical Biology*, 102, 016004, 2015
17. **Jin Yu***. Efficient fidelity control by stepwise nucleotide selection in polymerase elongation. *Molecular Based Mathematical Biology*, 2,141-160, 2014
16. Baogen Duan, Shaogui Wu, Lin-Tai Da, **Jin Yu***. A critical residue selectively recruits nucleotides for T7 RNA polymerase transcription fidelity control. *Biophysical Journal*, 107, 2130-2140, 2014
15. **Jin Yu***. Coordination and control inside simple biomolecular machines. *Advances in Experimental Medicine and Biology In Protein Conformation Dynamics* by Springer 805, 2014, 353-384, Springer, 2014
14. **Jin Yu***, George Oster*. A small post-translocation energy bias aids nucleotide translocation in T7 RNA polymerase transcription. *Biophysical Journal*, 102, 532-541, 2012.
13. **Jin Yu***, Wei Cheng, Carlos Bustamante, and George Oster*. Coupling translocation with nucleic acid unwinding by NS3 helicase. *Journal of Molecular Biology*, 404:439-455, 2010.
12. Jeehae Park, Sua Myong, Anita Niedziela-Majka, Kyung Suk Lee, **Jin Yu**, Timothy M. Lohman, Taekjip Ha*. PcrA helicase dismantles RecA filaments by reeling in DNA in uniform steps. *Cell*, 142:544-555, 2010.
11. **Jin Yu**, Jeff Moffitt, Craig Hetherington, Carlos Bustamante, and George Oster*. Mechanochemistry of a viral DNA packaging motor. *Journal of Molecular Biology*, 400:186-203, 2010.

10. Shuxun Cui, **Jin Yu**, Ferdinand Kühner, Klaus Schulten, and Hermann E. Gaub*. Double stranded DNA dissociates into single strands when dragged into a poor solvent. *Journal of the American Chemical Society*, 129:14710-14716, 2007.

9. Sungchul Hohng, Ruobo Zhou, Michelle K. Nahas, **Jin Yu**, Klaus Schulten, David M. J. Lilley, and Taekjip Ha*. Mapping the two-dimensional reaction landscape of Holliday junction via dynamic fluorescence-force spectroscopy. *Science*, 318:279-283, 2007.

8. **Jin Yu**, Taekjip Ha, and Klaus Schulten*. How directional translocation is regulated in a DNA helicase motor. *Biophysical Journal*, 93:3783-3797, 2007.

7. Markus Dittrich, **Jin Yu**, and Klaus Schulten*. PcrA helicase, a molecular motor studied from the electronic to the function level. *Atomistic Approaches in Modern Biology. Topics in Current Chemistry*, 268: 319-347, Springer, 2006.

6. **Jin Yu**, Taekjip Ha, and Klaus Schulten*. Structure-based model of the stepping motor of PcrA helicase. *Biophysical Journal*, 91:2097-2114, 2006.

5. **Jin Yu**, Andrea J. Yool, Klaus Schulten, and Emad Tajkhorshid*. Mechanism of gating and ion conductivity of a possible tetrameric pore in Aquaporin-1. *Structure*, 14:1411-1423, 2006.

4. **Jin Yu**, Taekjip Ha, and Klaus Schulten*. Conformational model of the Holliday junction transition deduced from molecular dynamics simulations. *Nucleic Acids Research*, 32:6683-6695, 2004.

3. **Jin Yu** and Guozhen Wu*. The Lyapunov analysis of the highly excited bend motion of acetylene. *Chemical Physics Letters*, 343: 375-382, 2001.

2. **Jin Yu** and Guozhen Wu*. Classical characters of highly bend dynamics of acetylene in two coupled SU(2) coset spaces. *Journal of Chemical Physics*, 113:647-652, 2000.

1. **Jin Yu**, Songtao Li and Guozhen Wu*. Multifractal analysis for the eigencoefficients of the eigenstates of highly excited vibration. *Chemical Physics Letters*, 301:217-222, 1999.

CONFERENCE PRESENTATIONS

- Talk “Simulating Life’s Key Protein Machines in Metabolic and Genetic Control” at the WPI Nano Life Science Institute, Kanazawa University, Japan, March 2018
- Talk “How does a viral RNA polymerase ratchet along DNA without backtracking?” the 2nd IAS Focused Program on Mechanisms of Transcription and Its Regulation, HKUST, Hong Kong, March 2018
- Poster “How does a viral RNA polymerase ratchet along DNA without backtracking?”, Biophysical Society Annual Meeting, San Francisco, CA, USA, Feb 2018

- Talk “Revealing translocation mechanism of a viral transcription machine on DNA and designing for backtracking mutants”, Chinese Biophysical Society Annual Meeting, Shanghai, China, Nov 2017
- Talk “Revealing Underlying Physics from Life’s Key Protein Machines in Metabolic and Genetic Control” at the Federal University of Rio de Janeiro, Brazil, Oct 2017
- Poster “Translocation of a viral RNA polymerase on DNA and the backtracking mutant design”, Gordon Research Conference on Synthetic Biology, Stowe, VT, USA, July 2017
- Talk “Deciphering intrinsic inter-subunit couplings that lead to sequential hydrolysis of F_1 -ATPase ring”, 第十届全国软物与生命物质物理学术会议, 厦门, Mar 2017
- Poster “Transcription studied in a nutshell on T7 RNA polymerase ratcheting along DNA”, Gordon Research Conference on Stochastic Physics in Biology, Ventura, CA, USA, Jan 2017
- Talk “Revealing physics from key bio-molecular machines combining chemical kinetics with molecular dynamics”, Telluride Workshop on Single Molecule: Theory Meets Experiment, Telluride, CO, USA, July 2016
- Talk “Simulating life’s key molecule machines for metabolic and genetic control”, 第一届全国单分子生物学学术研讨会, The 1st Single Molecule Biophysics Panel Workshop 北京, Beijing May 2016;
- Talk “Modeling Fluctuation and Control in Transcription Elongation from T7 RNA Polymerase to Polymerase II”, IAS Focused Program on Mechanisms of Transcription and its Regulation, HKUST, Hong Kong, Jan 2016
- Talk “Mechanochemical and fidelity control of simple biomolecular machines”, 定量生物学青年论坛, Workshop on Quantitative Biology for Young scholars 中科院先进研究院, CAS Advanced School, 深圳, Shenzhen, Dec 2015
- Talk “Mechanochemical and fidelity control of simple biomolecular machines”, Pacificchem 2015 Symposia, Hawaii, USA, Dec 2015
- Short presentation “Modeling genetic and metabolic molecular machines”, 复杂体系计算统计力学研讨会, Computational and Statistical Mechanics in Complex System Research 北京, Beijing, Oct 2015
- Poster “Modeling the fluctuation and control in RNA polymerase transcription from bacteriophage T7 to yeast system”, Mechanisms of Eukaryotic Transcription, Cold Spring Harbor Laboratory Meeting, NY, USA, Aug 2015
- Talk “Fluctuation and control in T7 RNA polymerase transcription elongation” The 9th Asian Biophysics Association Symposium (ABA2015), Shangyu, China May 2015
- Talk “Coordination and control of motor-driven viral DNA packaging” The 8th Australia New Zealand Mathematics Convention. Topology, Geometry and Combinatorics of Biopolymers. University of Melbourne, Australia, Dec 2014
- Talk “Coordination and control in the ring-shaped molecular motors”. The 52nd Annual Meeting of the Biophysical Society of Japan, Sapporo, Japan, Sept 2014
- Talk “Fluctuation and fidelity control of a non-proofreading polymerase”, Chinese Physical Society Fall Meeting 中国物理学会秋季学术会议, 哈尔滨, Harbin Sept 2014
- Talk “Fluctuation and fidelity control of a non-proofreading polymerase” SIAM Conference on the Life Sciences, Charlotte, NC, USA, Aug 2014

- Talk “Fluctuation and fidelity control of a non-proofreading polymerase” International Conference on Modeling of Complex Biological Systems, 南开大学 Nankai U, Tianjin, May 2014
- Talk “Fluctuation and fidelity control of a non-proofreading polymerase” American Physical Society Annual Meeting, Denver, USA, March 2014
- Talk “Fluctuation and fidelity control of a non-proofreading polymerase” Frontiers of Theoretical and Computational Physics and Chemistry, Thailand, Dec 2013
- Talk “Fluctuation and Fidelity Control of a non-proofreading polymerase”, Mathematical Modeling and Scientific Computing in Biology and Life Science, 上海交大 SJTU, Shanghai, Dec 2013
- Talk “Mechanochemical Control of Speed and Accuracy in Polymerase Elongation”. Computational Methods for Biological and Complex Systems, Seoul, Korea, July 2013 (Korea Institute of Advanced Study, Satellite Meeting of STAPHYS)
- Poster: “Computational Studies on Physical Mechanisms of T7 RNA Polymerase: Elongation and Nucleotide Selection”. 57th Biophysical Society Annual Meeting, PHL, PA, USA Feb 2013 (American Biophysical Society)
- Talk “Fluctuating Biomolecules under Tension” 首届世界华人计算生物和分子模拟大会 The first Chinese International Meeting on Computational Biology and Molecular Simulation, 大连, Dalian Aug 2012 (大连化物所)
- Talk “From helicase unwinding to polymerase transcription” Society of Mathematic Biology Annual Meeting, Knoxville, TN, USA, July 2012
- Talk “How energy is expended in single molecule gene transcription” East Asia Joint Seminars on Statistical Physics, 苏州大学, March 2012.
- Talk “Fluctuating biomolecules under tension” Fluctuation Theorems and Interdisciplinary Application, Kavli Institute for Theoretical Physics China, ITP, 中科院理论物理所, Beijing, December 2011
- Talks on “Modeling molecular machines that drive genetic processes”, UC Davis Math, Jan 2011; UC San Francisco Pharmaceutical Chemistry, Jan 2011; UC Riverside Biochemistry, Jan 2011; U Pittsburgh Computation and System Biology, Feb 2011
- “Coupling translocation and nucleic acid unwinding: a semi-quantitative model of NS3 helicase from Hepatitis C Virus”, Physical and Computational Approaches to Cancer Biology Workshop, Helen Diller Family Comprehensive Cancer Center at UC San Francisco, March, 2011; Biophysical Society Meeting, CPOW Travel Award, Baltimore, MD, March 2011.
- “Mechanochemical model of a viral DNA packaging motor”, Keystone Symposia Scholarship on Future of Science Fund “AAA+ and Related ATP-Driven Protein Machines”, Tahoe, CA, March, 2011; Biophysical Society Annual Meeting, San Francisco, CA, February 2010; Gordon Research Conference, Soft Condensed Matter Physics (Soft meets Biology), Colby-Sawyer College, New London, NH, Aug 2009; 21st International Congress of Biochemistry and Molecular Biology (Young Scientist Program), Shanghai, China, July 2009.
- Talk “Probing design principle: molecular motor scooting along DNA/RNA”, Simbios NIH Center for Biomedical Computation at Stanford University, Palo Alto, CA, March 2009.
- Talk “How directional translocation is regulated in a DNA helicase motor,” Center for Theoretical Biological Physics at UC San Diego, La Jolla, CA, March 2007.
- Poster “Structure-based model of a stepping motor on ssDNA: PcrA Helicase,”

Biophysical Society Annual Meeting, Salt Lake City, UT, February 2006.

- Poster “Molecular dynamics studies of nucleotide gated ion channel activity of Aquaporin-1,” Biophysical Society Annual Meeting, Long Beach, CA, February 2005.
- Poster “Conformational geometries of Holliday junction in conformer transition,” Statistical Physics of Macromolecules Meeting by LANL, Sante Fe, NM, May 2004.

CONFERENCE ORGANIZED

- Workshop on DNA Chromosome Structure and Dynamics, CSRC, Beijing, July 2017
- Training workshop: From cellular signal transduction to single molecule studies and atomistic simulations @第十届全国软物与生命物质物理学术会议, Xiamen, Mar 2017
- CSRC- KIAS- RIKEN Workshop on Kinetics of Enzymes and Molecular Machines, Beijing, Aug 2015
- Workshop on the Physics of Living Matter: from Molecules to Systems, CSRC, Beijing, Dec 2014
- Hands-on Workshop on Biomolecular Computation and Data Analysis, CSRC, Beijing, March and Apr 2104
- Workshop on Energy Landscape of Complex Systems, CSRC, Beijing, June 2013

POSTDOC SPONSOR

- Dr Wan Biao 万彪 (PhD from CAS Physics) 2017 ~ 2019
- Dr Pavel Loskot (PhD from Alberta U, Canada ECE) 2014-2015
- Dr Duan Baogen 段宝根 (PhD from CAS chemistry) 2012-2014
- Dr Wu Shaogui 伍绍贵 (PhD from CAS chemistry) 2012-2014
- Dr Chai Yan 柴彦 (PhD from Max-Planck Physics) 2012-2014

GRADUATE STUDENT SUPERVISION

- Dai Liqiang 戴立强 (BS from Tongji U Physics 2013, MS 2017, PhD → 2019)
- E Chao 鄂超 (BS from Huangzhong U Chemistry 2013, MS 2016 , PhD → 2019)
- Long Chunhong 龙春红 (BS from Southwest U Physics 2014, MS 2016, PhD → 2019)
- Jing Xiaobo 景晓波 (BS from Lanzhou U Math 2014, MS 2016)

VISITING STUDENT HOST

- Ren Boyu (BS from Peking U Physics, summer research 2013)
- Zhang Fangfei (BS from HK Baptist U Chemistry, summer research 2014)
- Liu Cindy (BS from Rice U Computer Science, summer research 2015)
- Li Xiao (BS from Beijing Normal U, fall research 2015)
- Xiao Heting and Wang Shiyi (BS from Jilin U Medical School, winter research 2016)
- Shen Kangqi (BS from Sichuan U Physics, spring research 2017)

THESIS COMMITTEE/REVIEW

- PKU Chemistry and Physics (北大化学, 物理学院) May 2013 (PhD graduates: Wu Yiran; Jin Fan; He Shan)
- NIBS (北京生命科学研究所) May 2013 (two PhD graduates: Wan Xiaobo; Wu Yao)
- Tsinghua Physics (清华物理系) Oct 2013 (PhD graduates; Dong Chengwei)
- PKU Chemistry (北大化学院) May 2014 (PhD graduate: Yu Daqi)
- Tsinghua Life Science (清华生命科学学院) July 2014 (PhD graduate: Tan Xianwei)
- CAS Physics (中科院物理所) Nov 2014 (PhD graduate: Zhou Zhi)
- PKU Chemistry (北大化学院) May 2015 (PhD graduate: Zhou Chenyang)
- PKU Physics (北大物理学院) Apr 2016 (PhD graduate: Cao Yuanshen)
- Tsinghua Physics (清华物理系) Apr 2016 (MS graduate: Wang Peng, Lin Anqi, Xu Jianfeng);
- Tsinghua Life Science (清华生命科学学院) March 2016 (PhD graduate: Liu Huihui)
- PKU Chemistry (北大化学院) June 2016 (PhD graduate: Gu Chan, Chen Xing)
- U CAS (国科大) May 2017 (MS graduate: Wang Xi, Dong Zhen, Ying Linggang)
- PKU Q-Bio (北大定量生物中心) May 2017 (PhD graduate: Cao Huaiqin, Chen Shuobing)

JOURNAL REVIEW

Accounts of Chemical Research
ACS Chemical Neural Science
Acta Physico-Chimica Sinica PKU
Biophysical Journal
Chinese Physics B
International Journal of Modern Physics C
Journal of the American Chemical Society
Journal of Biomolecular Structure and Dynamics
Journal of Chemical Theory and Computation
Journal of Modern Physics
Journal of Theoretical and Computational Chemistry
Mathematical Biosciences and Engineering
Molecular Based Mathematical Biology
Molecular BioSystems
Physical Review Letters
PLoS Computational Biology
PLoS One
Proteins: Structure, Function, and Bioinformatics
Scientific Reports