

Stanford



Lei Stanley Qi

Assistant Professor of Bioengineering and of Chemical and Systems Biology

CONTACT INFORMATION

- **Administrative Contact**

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Bio

BIO

Dr. Lei Qi (Stanley) is Assistant Professor in the Department of Bioengineering (School of Engineering), Department of Chemical and Systems Biology (School of Medicine), and a core faculty member in Stanford ChEM-H Institute. He is one pioneer in the CRISPR technology development for genome engineering. He has developed the CRISPRi/a technologies for purposes beyond gene editing: gene regulation using CRISPR interference (CRISPRi, gene repression) and CRISPR activation (CRISPRa, gene activation), CRISPR dynamic imaging of chromatin in living cells, and CRISPRi/a high-throughput single or combinatorial genetic screens. He is also active in the field of Synthetic Biology and has developed synthetic noncoding RNAs for controlling transcription and translation. He obtained his Ph.D. in Bioengineering from the University of California Berkeley/UCSF in 2012. He joined UCSF as faculty fellow between 2012 to 2014, and joined the faculty at Stanford University since 2014. His lab currently is applying genetic engineering to rational cell design for understanding genomics and cell therapy.

ACADEMIC APPOINTMENTS

- Assistant Professor, Bioengineering
- Assistant Professor, Chemical and Systems Biology
- Member, Bio-X
- Member, Stanford Cancer Institute
- Faculty Fellow, Stanford ChEM-H
- Member, Wu Tsai Neurosciences Institute

ADMINISTRATIVE APPOINTMENTS

- Scientific Advisory Board, Caribou Biosciences, (2012-2015)
- Faculty Fellow (Systems Biology), UCSF, (2012-2014)
- Assistant Professor, Stanford, (2014- present)

HONORS AND AWARDS

- Phi Beta Kappa Honorary Member, Phi Beta Kappa (2011)
- Chinese Government Award For Outstanding Students Abroad, Chinese government (2012)

- NIH Director's Independence Award, National Institutes of Health (2013)
- David Morgenthaler II Faculty Fellow, Stanford University (2014)
- Pew Biomedical Scholar, The Pew Charitable Trusts (2016)
- Alfred P. Sloan Fellowship, Alfred P. Sloan Foundation (2017)
- Next Power Honorary Chair Professor, National Tsing Hua University (2017)
- Frontiers of Science Award, Society of Cosmetic Chemists (2017)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Member, Phi Beta Kappa (2011 - present)
- Member, Sigma Xi (2017 - present)
- Associate Editor, The CRISPR Journal (2017 - present)

PROFESSIONAL EDUCATION

- B.S., Tsinghua University , Math and Physics (2005)
- M.A., University of California, Berkeley , Physics (2007)
- Ph.D., University of California, Berkeley/UCSF , Bioengineering (2012)

PATENTS

- Qi LS, Wang H. "United States Patent US provisional patent application No. 62/722,684 Systems and methods for polynucleotide spatial organization", Leland Stanford Junior University, Sep 1, 2018
- Qi LS, Dingal DCPD. "United States Patent US Patent NO. 9,856,497 Recombinant chimeric receptors for antigen sensing and genome manipulation", Leland Stanford Junior University, Dec 20, 2017
- Qi LS, Liu Y. "United States Patent US provisional patent application NO. 27/998,407 Compositions and methods identifying and using stem cell differentiation markers", Leland Stanford Junior University, Dec 1, 2017
- Lei S Qi, Rachel E Haurwitz, Jennifer A Doudna, Adam P Arkin. "United States Patent US Patent application NO. 14/248,980 & WO 2011/143124; US Patent No. 9,745,610. Methods and compositions for controlling gene expression by RNA processing", University of California, Sep 29, 2017
- Lei S Qi, Chang Liu, Adam P Arkin. "United States Patent US Patent NO. 9,593,338 Synthetic transcriptional control elements and methods of generating and using such elements", University of California, Mar 14, 2017
- Qi LS, Liu Y. "United States Patent US provisional patent application NO. 27/998,407 Compositions and methods identifying and using stem cell differentiation markers", Leland Stanford Junior University, Jan 8, 2017
- Zalatan J, Lim WA, Qi LS. "United States Patent US Patent application No. 15/514,892 Scaffold RNAs", University of California, Dec 1, 2015
- Qi LS, Ding S, Chen Y. "United States Patent US provisional patent application NO. 62/104,035 Systems and methods for modulating CRISPR/Cas9 genome editing", Leland Stanford Junior University, Feb 1, 2015
- Qi LS, Tanenbaum ME, Gilbert LA, Weissman JS, Vale RD. "United States Patent US provisional patent application NO. 62/024,241 A protein tagging system for in vivo single molecule imaging and control of gene transcription", University of California, Sep 1, 2014
- Gilbert LA, Horlbeck MA, Kampmann M, Weissman JS, Qi LS. "United States Patent US provisional patent application NO. 62/024,373 Genome-scale CRISPR-mediated control of gene expression", University of California, Sep 1, 2014
- Qi LS, Chen B, Huang B. "United States Patent International patent provisional application NO. PCT/US2014/058133 Optimized small guide RNAs and methods of use", University of California, San Francisco, Sep 1, 2013
- Lei S Qi, Jennifer A Doudna, Martin Jinek, Emmanuelle Charpentier, Krzysztof Chylinski, James HD Cate, Wendell A Lim. "United States Patent US Patent App. 13/842,859 Methods and compositions for RNA-directed target DNA modification and for RNA-directed modulation of transcription", University of California, Mar 15, 2013

LINKS

- Stanley Qi Lab: <http://qilab.stanford.edu>
- Stanley Qi Google Scholar: <https://scholar.google.com/citations?user=7iV1PPYAAAAJ&hl=en>

Teaching

COURSES

2018-19

- Fundamentals for Engineering Biology Lab: BIOE 44 (Aut, Spr)

2017-18

- Biology and Applications of CRISPR/Cas9: Genome Editing and Epigenome Modifications: BIOS 268 (Spr)
- Fundamentals for Engineering Biology Lab: BIOE 44 (Aut, Spr)

2016-17

- Fundamentals for Engineering Biology Lab: BIOE 44 (Aut, Spr)

2015-16

- Fundamentals for Engineering Biology Lab: BIOE 44 (Aut)

STANFORD ADVISEES

Postdoctoral Faculty Sponsor

Paul Finn, Mengting Han, Xueqiu Lin, Yanxia Liu, Jens Magnusson, Haifeng Wang, Lingling Wu, Xiaoshu Xu, Leiping Zeng

Doctoral Dissertation Advisor (AC)

Salil Bhate, Hannah Kempton, Nathan Kipniss

Master's Program Advisor

Katie Gu

Doctoral (Program)

Salil Bhate, Yukun Hao, Akshay Maheshwari

Postdoctoral Research Mentor

Muneaki Nakamura

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Bioengineering (Phd Program)
- Chemical and Systems Biology (Phd Program)

Publications

PUBLICATIONS

- **CRISPhicRmix: a hierarchical mixture model for CRISPR pooled screens.** *Genome biology*
Daley, T. P., Lin, Z., Lin, X., Liu, Y., Wong, W. H., Qi, L. S.
2018; 19 (1): 159
- **CRISPR-Mediated Programmable 3D Genome Positioning and Nuclear Organization.** *Cell*
Wang, H., Xu, X., Nguyen, C. M., Liu, Y., Gao, Y., Lin, X., Daley, T., Kipniss, N. H., La Russa, M., Qi, L. S.
2018
- **CRISPR Activation Screens Systematically Identify Factors that Drive Neuronal Fate and Reprogramming.** *Cell stem cell*
Liu, Y., Yu, C., Daley, T. P., Wang, F., Cao, W. S., Bhate, S., Lin, X., Still, C. 2., Liu, H., Zhao, D., Wang, H., Xie, X. S., Ding, et al
2018

- **Genetic interaction mapping in mammalian cells using CRISPR interference.** *Nature methods*
Du, D., Roguev, A., Gordon, D. E., Chen, M., Chen, S., Shales, M., Shen, J. P., Ideker, T., Mali, P., Qi, L. S., Krogan, N. J.
2017; 14 (6): 577-580
- **Engineering cell sensing and responses using a GPCR-coupled CRISPR-Cas system.** *Nature communications*
Kipniss, N. H., Dingal, P. C., Abbott, T. R., Gao, Y., Wang, H., Dominguez, A. A., Labanieh, L., Qi, L. S.
2017; 8 (1): 2212
- **Complex transcriptional modulation with orthogonal and inducible dCas9 regulators.** *Nature methods*
Gao, Y., Xiong, X., Wong, S., Charles, E. J., Lim, W. A., Qi, L. S.
2016
- **A Comprehensive, CRISPR-based Functional Analysis of Essential Genes in Bacteria** *CELL*
Peters, J. M., Colavin, A., Shi, H., Czarny, T. L., Larson, M. H., Wong, S., Hawkins, J. S., Lu, C. H., Koo, B., Marta, E., Shiver, A. L., Whitehead, E. H., Weissman, et al
2016; 165 (6): 1493-1506
- **Small Molecules Enhance CRISPR Genome Editing in Pluripotent Stem Cells.** *Cell stem cell*
Yu, C., Liu, Y., Ma, T., Liu, K., Xu, S., Zhang, Y., Liu, H., La Russa, M., Xie, M., Ding, S., Qi, L. S.
2015; 16 (2): 142-147
- **Engineering Complex Synthetic Transcriptional Programs with CRISPR RNA Scaffolds** *CELL*
Zalatan, J. G., Lee, M. E., Almeida, R., Gilbert, L. A., Whitehead, E. H., La Russa, M., Tsai, J. C., Weissman, J. S., Dueber, J. E., Qi, L. S., Lim, W. A.
2015; 160 (1-2): 339-350
- **Dynamic Imaging of Genomic Loci in Living Human Cells by an Optimized CRISPR/Cas System** *CELL*
Chen, B., Gilbert, L. A., Cimini, B. A., Schnitzbauer, J., Zhang, W., Li, G., Park, J., Blackburn, E. H., Weissman, J. S., Qi, L. S., Huang, B.
2013; 155 (7): 1479-1491
- **CRISPR-Mediated Modular RNA-Guided Regulation of Transcription in Eukaryotes** *CELL*
Gilbert, L. A., Larson, M. H., Morsut, L., Liu, Z., Brar, G. A., Torres, S. E., Stern-Ginossar, N., Brandman, O., Whitehead, E. H., Doudna, J. A., Lim, W. A., Weissman, J. S., Qi, et al
2013; 154 (2): 442-451
- **Repurposing CRISPR as an RNA-Guided Platform for Sequence-Specific Control of Gene Expression** *CELL*
Qi, L. S., Larson, M. H., Gilbert, L. A., Doudna, J. A., Weissman, J. S., Arkin, A. P., Lim, W. A.
2013; 152 (5): 1173-1183
- **Evolution at the Cutting Edge: CRISPR-Mediated Directed Evolution.** *Molecular cell*
Abbott, T. R., Qi, L. S.
2018; 72 (3): 402-3
- **DNMT3A and TET1 cooperate to regulate promoter epigenetic landscapes in mouse embryonic stem cells** *GENOME BIOLOGY*
Gu, T., Lin, X., Cullen, S. M., Luo, M., Jeong, M., Estecio, M., Shen, J., Hardikar, S., Sun, D., Su, J., Rux, D., Guzman, A., Lee, et al
2018; 19: 88
- **A CRISPR-dCas Toolbox for Genetic Engineering and Synthetic Biology.** *Journal of molecular biology*
Xu, X., Qi, L. S.
2018
- **CRISPR-Based Chromatin Remodeling of the Endogenous Oct4 or Sox2 Locus Enables Reprogramming to Pluripotency** *CELL STEM CELL*
Liu, P., Chen, M., Liu, Y., Qi, L. S., Ding, S.
2018; 22 (2): 252-+
- **Low-intensity extracorporeal shock wave therapy promotes myogenesis through PERK/ATF4 pathway** *NEUROUROLOGY AND URODYNAMICS*
Wang, B., Zhou, J., Banie, L., Reed-Maldonado, A. B., Ning, H., Lu, Z., Ruan, Y., Zhou, T., Wang, H., Oh, B., Wang, G., Qi, S., Lin, et al
2018; 37 (2): 699-707
- **Multiplexed Dynamic Imaging of Genomic Loci by Combined CRISPR Imaging and DNA Sequential FISH** *BIOPHYSICAL JOURNAL*
Takei, Y., Shah, S., Harvey, S., Qi, L. S., Cai, L.

2017; 112 (9): 1773-1776

- **A Single-Chain Photoswitchable CRISPR-Cas9 Architecture for Light-Inducible Gene Editing and Transcription** *A Single-Chain Photoswitchable CRISPR-Cas9 Architecture for Light-Inducible Gene Editing and Transcription*
Zhou, X. X., Zou, X., Chung, H. K., Gao, Y., Liu, Y., Qi, L. S., Lin, M. Z.
2017: 443-48
- **Genetic and epigenetic control of gene expression by CRISPR-Cas systems.** *F1000Research*
Lo, A., Qi, L.
2017; 6
- **Applications of CRISPR Genome Engineering in Cell Biology.** *Trends in cell biology*
Wang, F., Qi, L. S.
2016; 26 (11): 875-888
- **CRISPR Interference Efficiently Induces Specific and Reversible Gene Silencing in Human iPSCs** *CELL STEM CELL*
Mandegar, M. A., Huebsch, N., Frolov, E. B., Shin, E., Truong, A., Olvera, M. P., Chan, A. H., Miyaoka, Y., Holmes, K., Spencer, C. I., Judge, L. M., Gordon, D. E., Eskildsen, et al
2016; 18 (4): 541-553
- **YAP Induces Human Naive Pluripotency.** *Cell reports*
Qin, H., Hejna, M., Liu, Y., Percharde, M., Wossidlo, M., Blouin, L., Durruthy-Durruthy, J., Wong, P., Qi, Z., Yu, J., Qi, L. S., Sebastiano, V., Song, et al
2016; 14 (10): 2301-2312
- **CRISPR Technology for Genome Activation and Repression in Mammalian Cells.** *Cold Spring Harbor protocols*
Du, D., Qi, L. S.
2016; 2016 (1): pdb prot090175-?
- **An Introduction to CRISPR Technology for Genome Activation and Repression in Mammalian Cells.** *Cold Spring Harbor protocols*
Du, D., Qi, L. S.
2016; 2016 (1): pdb top086835-?
- **CRISPR/Cas9 in Genome Editing and Beyond** *ANNUAL REVIEW OF BIOCHEMISTRY, VOL 85*
Wang, H., La Russa, M., Qi, L. S.
2016; 85: 227-264
- **Beyond editing: repurposing CRISPR-Cas9 for precision genome regulation and interrogation** *NATURE REVIEWS MOLECULAR CELL BIOLOGY*
Dominguez, A. A., Lim, W. A., Qi, L. S.
2016; 17 (1)
- **CRISPR/Cas9 for Human Genome Engineering and Disease Research** *ANNUAL REVIEW OF GENOMICS AND HUMAN GENETICS, VOL 17*
Xiong, X., Chen, M., Lim, W. A., Zhao, D., Qi, L. S.
2016; 17: 131-154
- **CRISPR-ERA: a comprehensive design tool for CRISPR-mediated gene editing, repression and activation** *BIOINFORMATICS*
Liu, H., Wei, Z., Dominguez, A., Li, Y., Wang, X., Qi, L. S.
2015; 31 (22): 3676-3678
- **The New State of the Art: Cas9 for Gene Activation and Repression** *MOLECULAR AND CELLULAR BIOLOGY*
La Russa, M. F., Qi, L. S.
2015; 35 (22): 3800-3809
- **Bacterial CRISPR: accomplishments and prospects** *CURRENT OPINION IN MICROBIOLOGY*
Peters, J. M., Silvis, M. R., Zhao, D., Hawkins, J. S., Gross, C. A., Qi, L. S.
2015; 27: 121-126
- **Specific Gene Repression by CRISPRi System Transferred through Bacterial Conjugation** *ACS SYNTHETIC BIOLOGY*
Ji, W., Lee, D., Wong, E., Dadlani, P., Dinh, D., Huang, V., Kearns, K., Teng, S., Chen, S., Haliburton, J., Heimberg, G., Heineke, B., Ramasubramanian, et al
2014; 3 (12): 929-931
- **A versatile framework for microbial engineering using synthetic non-coding RNAs** *NATURE REVIEWS MICROBIOLOGY*

Qi, L. S., Arkin, A. P.

2014; 12 (5): 341-354

- **Dynamic Imaging of Genomic Loci in Living Human Cells by an Optimized CRISPR/Cas System (vol 155, pg 1479, 2013) *CELL***
Chen, B., Gilbert, L. A., Cimini, B. A., Schnitzbauer, J., Zhang, W., Li, G., Park, J., Blackburn, E. H., Weissman, J. S., Qi, L. S., Huang, B.
2014; 156 (1-2): 373-373
- **CRISPR interference (CRISPRi) for sequence-specific control of gene expression *NATURE PROTOCOLS***
Larson, M. H., Gilbert, L. A., Wang, X., Lim, W. A., Weissman, J. S., Qi, L. S.
2013; 8 (11): 2180-2196
- **An adaptor from translational to transcriptional control enables predictable assembly of complex regulation *NATURE METHODS***
Liu, C. C., Qi, L., Lucks, J. B., Segall-Shapiro, T. H., Wang, D., Mutalik, V. K., Arkin, A. P.
2012; 9 (11): 1088-?
- **RNA processing enables predictable programming of gene expression *NATURE BIOTECHNOLOGY***
Qi, L., Haurwitz, R. E., Shao, W., Doudna, J. A., Arkin, A. P.
2012; 30 (10): 1002-?
- **Engineering naturally occurring trans-acting non-coding RNAs to sense molecular signals *NUCLEIC ACIDS RESEARCH***
Qi, L., Lucks, J. B., Liu, C. C., Mutalik, V. K., Arkin, A. P.
2012; 40 (12): 5775-5786
- **Rationally designed families of orthogonal RNA regulators of translation *NATURE CHEMICAL BIOLOGY***
Mutalik, V. K., Qi, L., Guimaraes, J. C., Lucks, J. B., Arkin, A. P.
2012; 8 (5): 447-454
- **Versatile RNA-sensing transcriptional regulators for engineering genetic networks *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA***
Lucks, J. B., Qi, L., Mutalik, V. K., Wang, D., Arkin, A. P.
2011; 108 (21): 8617-8622
- **Regulation of transcription by unnatural amino acids *NATURE BIOTECHNOLOGY***
Liu, C. C., Qi, L., Yanofsky, C., Arkin, A. P.
2011; 29 (2): 164-U111
- **Toward scalable parts families for predictable design of biological circuits *CURRENT OPINION IN MICROBIOLOGY***
Lucks, J. B., Qi, L., Whitaker, W. R., Arkin, A. P.
2008; 11 (6): 567-573

PRESENTATIONS

- Programmable Engineering of the Mammalian Genome Using CRISPR - SEED (Synthetic Biology: Engineering, Evolution & Design) 2014 (7/14/2014 - 7/17/2014)
- Regulation of Gene Expression Using CRISPR interference (CRISPRi) - American Society of Microbiology (ASM) (5/17/2014 - 5/20/2014)
- Engineering of the Genome Using the CRISPR Technology - Keystone (4/6/2014 - 4/10/2014)
- Engineering of the Genome Using the CRISPR Technology - Cold Spring Harbor Laboratory (7/28/2014 - 8/11/2014)
- Engineering Synthetic RNA Elements to Build Genetic Systems - American Society of Microbiology (ASM) (6/16/2012 - 6/19/2012)
- Developing Versatile RNA-Based Genetic Programs - AIChE (6/24/2012 - 6/27/2012)