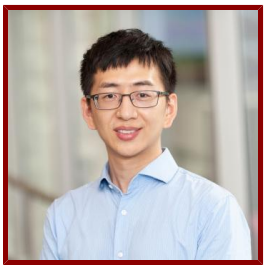
Stanford



Hao Zhang

Clinical Assistant Professor, Radiation Oncology - Radiation Physics

Bio

BIO

Hao Zhang is a Clinical Assistant Professor in the Department of Radiation Oncology at Stanford University. He earned his PhD in Biomedical Engineering from Stony Brook University, followed by a two-year postdoctoral fellowship at Johns Hopkins University. After completing his clinical physics training through the Stanford University Medical Physics Residency Program, he served as an Assistant Attending Physicist and Assistant Member at Memorial Sloan Kettering Cancer Center for five years.

His research interests include the development of novel imaging techniques, mathematical modeling of imaging systems and their underlying physics, integration of sophisticated models into iterative or deep learning-based reconstruction methods, and the translation of these approaches to clinical applications in both diagnostic imaging and image-guided radiation therapy.

ACADEMIC APPOINTMENTS

- Clinical Assistant Professor, Radiation Oncology - Radiation Physics

HONORS AND AWARDS

- 1st place Winner of RAMPS Sal Vacirca Young Investigator Symposium (Senior Author), Radiological and Medical Physics Society of New York (2025)
- 1st place Winner of AAPM Early-Career Investigator Clinical Symposium (Senior Author), AAPM Spring Clinical Meeting (2025)
- Best Oral Presentation award (Senior Author), Fully3D 2025 International Conference (2025)
- Early Career Investigators in Imaging Travel Award, American Association of Physicists in Medicine (2024)
- Council of Early Career Investigators in Imaging (CECI2), Academy for Radiology & Biomedical Imaging Research (2023-2024)
- Best in Physics (Imaging) Award, American Association of Physicists in Medicine (2018)
- Research Seed Funding Grant, American Association of Physicists in Medicine (2017)
- Trainee Award, IEEE Medical Imaging Conference (2014)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Program Committee Member, SPIE Medical Imaging, Physics of Medical Imaging conference (2025 - present)
- Scientific Committee Member, International Conference on Image Formation in X-Ray Computed Tomography (2024 - present)
- Scientific Committee Member, International Meeting on Fully Three-Dimensional Image Reconstruction in Radiology and Nuclear Medicine (2023 - present)
- Working Group Committee Member, AAPM Joint Working Group for Research Seed Funding Initiative (JWGRSF) (2023 - 2025)
- Task Group Committee Member, TG66U1 - Quality assurance for computed-tomography simulators in Radiation Oncology: An Update to the Report of the AAPM Radiation Therapy Committee TG66 (2021 - 2025)

PROFESSIONAL EDUCATION

- Residency, Stanford University , Medical Physics (2020)
- Ph.D., Stony Brook University , Biomedical Engineering (2016)

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Free-breathing gated CBCT acquisition on C-arm linear accelerator (LINAC) is time-consuming, typically requiring 2-8 min due to the repeated start-stop gantry motion synchronized with the respiratory gating signal. We propose a next-generation imaging paradigm, nonstop gated CBCT (ngCBCT), to substantially reduce acquisition time, lower imaging dose, and preserve image quality, thereby improving patient comfort and treatment accuracy.

Teaching

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Biomedical Physics (Phd Program)

Publications

PUBLICATIONS

- **Deep learning-based dual-domain reconstruction for nonstop gated CBCT in respiratory gating lung SBRT.** *Medical physics*
  Yu, M., Berry, S., Silverberg, N., Fu, Y., Harris, W., Cai, W., Kuo, L., He, X., Gelblum, D., Mueller, B., Cervino, L., Li, T., Li, et al
  2026; 53 (5): e70484
- **Dosimetric and treatment efficiency comparison of lung SBRT using three different motion management strategies.** *Clinical and translational radiation oncology*
  Lansing, T., Harris, W., Yu, M., Cheema, Z., He, X., Fu, Y., Lee, S. K., Cervino, L., Li, T., Li, X., Moran, J., Mueller, B., Gelblum, et al
  2026; 56: 101044
- **Dynamic cone beam CT reconstruction via spatiotemporal Gaussian neural representation.** *Medical physics*
  Fu, Y., Zhang, H., Cai, W., Xie, H., Kuo, L., Cervino, L., Moran, J., Li, X., Li, T.
  2025; 52 (11): e70127
- **Next-generation nonstop gated CBCT for respiratory gating lung radiotherapy: Scan time and imaging dose.** *Medical physics*
  He, X., Yu, M., Berry, S., Gao, Y., Fu, Y., Harris, W., Cai, W., Erdi, Y., Stiles, K., Lynch, D., Lim, S. B., Cervino, L., Li, et al
  2025; 52 (10): e70065
- **Nonstop gated CBCT for respiratory gating lung SBRT: A feasibility study.** *Medical physics*
  Yu, M., Berry, S., Fu, Y., Harris, W., Cai, W., Ziegenfus, M., Xie, H., Wang, A., Gelblum, D., Mueller, B., Cervino, L., Li, T., Li, et al
  2025; 52 (9): e18084
- **Super-resolution CBCT on a new generation flat panel imager of a C-arm gantry linear accelerator.** *Medical physics*
  Kuo, L., Li, F., Fu, Y., Zhang, H., Cervino, L. A., Moran, J. M., Li, X., Li, T.
  2025; 52 (7): e18000
- **Evaluation of model uncertainty in AI-based synthetic CT generation from CBCT for abdominal adaptive radiotherapy.** *Medical physics*
  Quintero, P., Cerviño, L., Zhang, H., Harris, W.
  2025; 52 (6): 4054-4067
- **Real-time 3D synthetic MRI based on kV imaging for motion monitoring of abdominal radiotherapy in a conventional LINAC.** *Physics in medicine and biology*
  Quintero, P., Wu, C., Zhang, H., Otazo, R., Cerviño, L., Harrys, W.
  2025; 70 (7)
- **Machine Learned Texture Prior From Full-Dose CT Database via Multi-Modality Feature Selection for Bayesian Reconstruction of Low-Dose CT.** *IEEE transactions on medical imaging*

Gao, Y., Tan, J., Shi, Y., Zhang, H., Lu, S., Gupta, A., Li, H., Reiter, M., Liang, Z.
2023; 42 (11): 3129-3139

- **Exploring Dual-Energy CT Spectral Information for Machine Learning-Driven Lesion Diagnosis in Pre-Log Domain.** *IEEE transactions on medical imaging*
  Chang, S., Gao, Y., Pomeroy, M. J., Bai, T., Zhang, H., Lu, S., Pickhardt, P. J., Gupta, A., Reiter, M. J., Gould, E. S., Liang, Z.
  2023; 42 (6): 1835-1845
- **A Joint-Parameter Estimation and Bayesian Reconstruction Approach to Low-Dose CT.** *Sensors (Basel, Switzerland)*
  Gao, Y., Lu, S., Shi, Y., Chang, S., Zhang, H., Hou, W., Li, L., Liang, Z.
  2023; 23 (3)
- **CBCT/CT-Based Image Synthesis** *Medical Image Synthesis: Methods and Clinical Applications*
  Zhang, H.
  CRC Press.2023; 1: 11
- **Artificial Intelligence in Radiation Therapy.** *IEEE transactions on radiation and plasma medical sciences*
  Fu, Y., Zhang, H., Morris, E. D., Glide-Hurst, C. K., Pai, S., Traverso, A., Wee, L., Hadzic, I., Lønne, P. I., Shen, C., Liu, T., Yang, X.
  2022; 6 (2): 158-181
- **Prior-image-based CT reconstruction using attenuation-mismatched priors.** *Physics in medicine and biology*
  Zhang, H., Capaldi, D., Zeng, D., Ma, J., Xing, L.
  2021; 66 (6): 064007
- **Direct reconstruction of anatomical change in low-dose lung nodule surveillance.** *Journal of medical imaging (Bellingham, Wash.)*
  Flores, J. D., Gang, G. J., Zhang, H., Lin, C. T., Fung, S. K., Stayman, J. W.
  2021; 8 (2): 023503
- **A robotically assisted 3D printed quality assurance lung phantom for Calypso.** *Physics in medicine and biology*
  Capaldi, D. P., Skinner, L. B., Dubrowski, P. n., Zhang, H. n., Xing, L. n., Chuang, C. F., Loo, B. W., Bush, K. K., Fahimian, B. P., Yu, A. S.
  2021
- **Characterization of tissue-specific pre-log Bayesian CT reconstruction by texture-dose relationship.** *Medical physics*
  Gao, Y., Liang, Z., Xing, Y., Zhang, H., Pomeroy, M., Lu, S., Ma, J., Lu, H., Moore, W.
  2020; 47 (10): 5032-5047
- **Full-Spectrum-Knowledge-Aware Tensor Model for Energy-Resolved CT Iterative Reconstruction** *IEEE TRANSACTIONS ON MEDICAL IMAGING*
  Zeng, D., Yao, L., Ge, Y., Li, S., Xie, Q., Zhang, H., Bian, Z., Zhao, Q., Li, Y., Xu, Z., Meng, D., Ma, J.
  2020; 39 (9): 2831–43
- **Second window near-infrared dosimeter (NIR2D) system for radiation dosimetry.** *Physics in medicine and biology*
  Kim, T. J., Cheng, K., Zhang, H., Liu, S., Skinner, L., Xing, L.
  2020; 65 (17): 175013
- **A Task-Dependent Investigation on Dose and Texture in CT Image Reconstruction** *IEEE TRANSACTIONS ON RADIATION AND PLASMA MEDICAL SCIENCES*
  Gao, Y., Liang, Z., Zhang, H., Yang, J., Ferretti, J., Bilfinger, T., Yaddanapudi, K., Schweitzer, M., Bhattacharji, P., Moore, W.
  2020; 4 (4): 441–49
- **Technical Note: Evaluation of Audiovisual Biofeedback Smartphone Application for Respiratory Monitoring in Radiation Oncology.** *Medical physics*
  Capaldi, D. P., Nano, T. F., Zhang, H. n., Skinner, L. B., Xing, L. n.
  2020
- **Contrast-Medium Anisotropy-Aware Tensor Total Variation Model for Robust Cerebral Perfusion CT Reconstruction With Low-Dose Scans** *IEEE TRANSACTIONS ON COMPUTATIONAL IMAGING*
  Zhang, Y., Peng, J., Zeng, D., Xie, Q., Li, S., Bian, Z., Wang, Y., Zhang, Y., Zhao, Q., Zhang, H., Liang, Z., Lu, H., Meng, et al
  2020; 6: 1375–88

- **A Feasibility Study of Extracting Tissue Textures From a Previous Full-Dose CT Database as Prior Knowledge for Bayesian Reconstruction of Current Low-Dose CT Images** *IEEE TRANSACTIONS ON MEDICAL IMAGING*
  Gao, Y., Liang, Z., Moore, W., Zhang, H., Pomeroy, M. J., Ferretti, J. A., Bilfinger, T., Ma, J., Lu, H.
  2019; 38 (8): 1981–92
- **An Efficient Iterative Cerebral Perfusion CT Reconstruction via Low-Rank Tensor Decomposition With Spatial-Temporal Total Variation Regularization.** *IEEE transactions on medical imaging*
  Li, S., Zeng, D., Peng, J., Bian, Z., Zhang, H., Xie, Q., Wang, Y., Liao, Y., Zhang, S., Huang, J., Meng, D., Xu, Z., Ma, et al
  2019; 38 (2): 360-370
- **Optimizing a Parameterized Plug-and-Play ADMM for Iterative Low-Dose CT Reconstruction.** *IEEE transactions on medical imaging*
  He, J., Yang, Y., Wang, Y., Zeng, D., Bian, Z., Zhang, H., Sun, J., Xu, Z., Ma, J.
  2019; 38 (2): 371-382
- **Regularization Analysis and Design for Prior-Image-Based X-Ray CT Reconstruction.** *IEEE transactions on medical imaging*
  Zhang, H., Gang, G. J., Dang, H., Stayman, J. W.
  2018; 37 (12): 2675-2686
- **Statistical CT reconstruction using region-aware texture preserving regularization learning from prior normal-dose CT image** *PHYSICS IN MEDICINE AND BIOLOGY*
  Jia, X., Liao, Y., Zeng, D., Zhang, H., Zhang, Y., He, J., Bian, Z., Wang, Y., Tao, X., Liang, Z., Huang, J., Ma, J.
  2018; 63 (22): 225020
- **Iterative quality enhancement via residual-artifact learning networks for low-dose CT.** *Physics in medicine and biology*
  Wang, Y., Liao, Y., Zhang, Y., He, J., Li, S., Bian, Z., Zhang, H., Gao, Y., Meng, D., Zuo, W., Zeng, D., Ma, J.
  2018; 63 (21): 215004
- **Regularization strategies in statistical image reconstruction of low-dose X-ray CT: A review.** *Medical physics*
  Zhang, H., Wang, J., Zeng, D., Tao, X., Ma, J.
  2018
- **Promote quantitative ischemia imaging via myocardial perfusion CT iterative reconstruction with tensor total generalized variation regularization.** *Physics in medicine and biology*
  Gu, C., Zeng, D., Lin, J., Li, S., He, J., Zhang, H., Bian, Z., Niu, S., Zhang, Z., Huang, J., Chen, B., Zhao, D., Chen, et al
  2018; 63 (12): 125009
- **Iterative reconstruction for low dose dual energy CT using information-divergence constrained spectral redundancy information.** *Journal of X-ray science and technology*
  Lin, J., Zhang, H., Huang, J., Bian, Z., Zhang, S., Wang, Y., Liao, Y., Li, S., Zhang, H., Zeng, D., Ma, J.
  2018; 26 (2): 311-330
- **Low-Dose Dynamic Cerebral Perfusion Computed Tomography Reconstruction via Kronecker-Basis-Representation Tensor Sparsity Regularization.** *IEEE transactions on medical imaging*
  Zeng, D., Xie, Q., Cao, W., Lin, J., Zhang, H., Zhang, S., Huang, J., Bian, Z., Meng, D., Xu, Z., Liang, Z., Chen, W., Ma, et al
  2017; 36 (12): 2546-2556
- **Assessment of prior image induced nonlocal means regularization for low-dose CT reconstruction: Change in anatomy.** *Medical physics*
  Zhang, H., Ma, J., Wang, J., Moore, W., Liang, Z.
  2017; 44 (9): e264-e278
- **Iterative reconstruction for dual energy CT with an average image-induced nonlocal means regularization.** *Physics in medicine and biology*
  Zhang, H., Zeng, D., Lin, J., Zhang, H., Bian, Z., Huang, J., Gao, Y., Zhang, S., Zhang, H., Feng, Q., Liang, Z., Chen, W., Ma, et al
  2017; 62 (13): 5556-5574
- **Applications of nonlocal means algorithm in low-dose X-ray CT image processing and reconstruction: A review.** *Medical physics*
  Zhang, H., Zeng, D., Zhang, H., Wang, J., Liang, Z., Ma, J.
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- **Texture Feature Extraction and Analysis for Polyp Differentiation via Computed Tomography Colonography.** *IEEE transactions on medical imaging*
  Hu, Y., Liang, Z., Song, B., Han, H., Pickhardt, P. J., Zhu, W., Duan, C., Zhang, H., Barish, M. A., Lascarides, C. E.

2016; 35 (6): 1522-31

- **Extracting Information From Previous Full-Dose CT Scan for Knowledge-Based Bayesian Reconstruction of Current Low-Dose CT Images.** *IEEE transactions on medical imaging*
  Zhang, H., Han, H., Liang, Z., Hu, Y., Liu, Y., Moore, W., Ma, J., Lu, H.
  2016; 35 (3): 860-70
- **Statistical image reconstruction for low-dose CT using nonlocal means-based regularization. Part II: An adaptive approach.** *Computerized medical imaging and graphics : the official journal of the Computerized Medical Imaging Society*
  Zhang, H., Ma, J., Wang, J., Liu, Y., Han, H., Lu, H., Moore, W., Liang, Z.
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- **Statistical image reconstruction for low-dose CT using nonlocal means-based regularization.** *Computerized medical imaging and graphics : the official journal of the Computerized Medical Imaging Society*
  Zhang, H., Ma, J., Wang, J., Liu, Y., Lu, H., Liang, Z.
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- **Low-mAs X-ray CT image reconstruction by adaptive-weighted TV-constrained penalized re-weighted least-squares.** *Journal of X-ray science and technology*
  Liu, Y., Ma, J., Zhang, H., Wang, J., Liang, Z.
  2014; 22 (4): 437-57
- **Integration of 3D scale-based pseudo-enhancement correction and partial volume image segmentation for improving electronic colon cleansing in CT colonograpy.** *Journal of X-ray science and technology*
  Zhang, H., Li, L., Zhu, H., Han, H., Song, B., Liang, Z.
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  Zhang, H., Han, H., Wang, J., Ma, J., Liu, Y., Moore, W., Liang, Z.
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- **Total variation-stokes strategy for sparse-view X-ray CT image reconstruction.** *IEEE transactions on medical imaging*
  Liu, Y., Liang, Z., Ma, J., Lu, H., Wang, K., Zhang, H., Moore, W.
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- **A unified EM approach to bladder wall segmentation with coupled level-set constraints.** *Medical image analysis*
  Han, H., Li, L., Duan, C., Zhang, H., Zhao, Y., Liang, Z.
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