

# Fan Xiao

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## Education

<b>Ludwig-Maximilians-Universität München, Munich, Germany</b>	2023.09 – Now
PhD candidate in Medical Physics	
Research focus: AI-based Efficient Sequence Modeling, Monte Carlo Simulation, Medical Image Segmentation	
<b>Southern Medical University, Guangzhou, China</b>	2020.09 – 2023.06
MS in Biomedical Engineering, GPA 3.6/4.0	
<b>Wuhan University of Technology, Wuhan, China</b>	2016.09 – 2020.06
BS in Communication Engineering	

## Research Experience

<b>Benchmarking Mamba/Transformer/ConvLSTM for Dose Calculation   First Author</b>	2025.07 – Now
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- Designed a GPU-accelerated processing pipeline using CuPy to perform Ray-Casting for segment projection and Cubic B-spline resampling for Beam's Eye View transformations
- Developed a unified benchmarking framework comparing CNN-Mamba, Transformer, CNN-ConvLSTM, and Unet for volumetric sequence modeling (high-resolution dense regression task)
- Developed an optimized inference pipeline integrating CUDA Graphs and Automatic Mixed Precision (AMP), achieving high-throughput inference (<40 ms/segment) with low memory footprint (2.9 GB), validated across multiple GPU generations
- Under revision: ***Physics in Medicine & Biology* (2026)**

<b>Real-Time MRI-Only Photon Dose Calculation Engine   First Author</b>	2024.10 – 2025.06
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- Proposed a CNN-RNN framework (UNet-LSTM) to approximate computationally expensive Monte Carlo particle transport simulations directly from MRI data
- Solved the domain shift challenge (lack of electron density information in MRI) by integrating CT-MRI deformable registration with a segmentation-guided feature mechanism
- Achieved 12 ms per photon beam inference latency with a gamma passing rate (2%/2mm) exceeding 99.50% compared to Monte Carlo ground truth
- Published in ***Medical Physics* (2025)**, DOI: [10.1002/mp.70106](https://doi.org/10.1002/mp.70106)

<b>Proton Range Verification via Prompt Gamma Emission Prediction   First Author</b>	2024.01 – 2024.09
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- Architected an LSTM model by integrating heterogeneous data streams (anatomical relative stopping power maps and physical dose fields) to predict prompt gamma emissions across wide proton energies (125–210 MeV).
- Achieved sub-millimeter accuracy with a mean absolute range shift deviation of 0.15 mm against Monte Carlo ground truth.
- Reduced prediction time to <130 ms per pencil beam, facilitating sub-second feedback for adaptive proton therapy.
- Published in ***Physics in Medicine & Biology* (2024)**, DOI: [10.1088/1361-6560/ad8e2a](https://doi.org/10.1088/1361-6560/ad8e2a)

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## Technical Skills

- Languages: Python, C++ (Geant4 focus), Bash.
  - Deep Learning: Pytorch, RNN/LSTM, Transformer, Mamba, Unet/nnUnet.
  - Tools: Git, Docker, Slurm, Cupy, Plastimatch, Pydicom, RayStation scripting.
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## Additional Info and Awards

- Selected Talks:  
AAPM 2025 (Washington, DC), ICCR 2024 (Lyon), ECMP 2024 (Munich).
- Awards:  
Chinese National Scholarship (2022) – Top 2%;  
First-class Academic Scholarship (2022, 2023) – Top 20%.
- Languages:  
Chinese (Native), English (Professional Working Proficiency).