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Admission Committee

*Helmholtz-Zentrum Dresden-Rossendorf (HZDR)
Center for Advanced Systems Understanding (CASUS)*

February 21, 2025

Dear Members of the Admissions Committee,

I am writing to express my sincere interest in the PhD position in Machine Learning for Quantum Computing and Simulation of Quantum Matter at your esteemed institute. With a Master's degree in Computational Mathematics, extensive hands-on expertise in AI-driven medical image analysis, and a deep passion for quantum computing, I am eager to contribute to your research program.

During my Master's studies (2019-2022), I specialized in Generative Adversarial Networks (GANs) with a focus on style transfer learning for personalized Chinese handwritten characters. This project sharpened my technical abilities and enhanced my proficiency in applying innovative computational methods—expertise that is directly transferable to implementing deep learning algorithms within your group.

As a research assistant at Sun Yat-sen University's Computational Medical Imaging Lab, I led two interdisciplinary projects that integrated deep learning with clinical diagnostics. I developed a multi-task learning model to classify the severity of Placenta Accreta Spectrum Disorder using T2-weighted MRI images, achieving an AUC of 0.80, and designed a CNN-based system to predict breast cancer metastasis in Sentinel Lymph Nodes via dual-energy CT scans, attaining an AUC of 0.85 in cross-validation. These experiences enhanced my proficiency in medical image analysis, deep learning, scholarly review, manuscript preparation, and interdisciplinary collaboration.

I am particularly drawn to your program's focus on the intersection of quantum computing and energy transition, which aligns perfectly with my aspiration to pioneer deep learning approaches for designing quantum computing algorithms. During my PhD, I intend to: (1) Optimize quantum computing algorithms and enhance the simulation of quantum materials; (2) Develop efficient ML/AI/QC software solutions; (3) Publish research findings in renowned journals and present at leading AI/ML conferences; (4) Collaborate with researchers across academic and industrial sectors.

A PhD at CASUS offers the ideal environment to advance my goal of integrating cutting-edge AI methodologies with quantum computing for real-world applications. In the long term, I aim to lead research that elucidates the complex interplay between AI and quantum matter, and I am excited by the opportunity to work alongside researchers from diverse backgrounds.

Thank you for considering my application. I welcome the opportunity to discuss how my background and research interests align with your strategic objectives.

Sincerely,

Hai Jiang