Dear MIT Committee,

I am writing to express my strong interest in the Postdoctoral Associate position in integrated core and edge MHD instability control at the MIT Plasma Science and Fusion Center. I hold a Ph.D. in plasma physics from the University of Science and Technology of China and am currently a postdoctoral researcher at UC Davis, where my work focuses on fusion diagnostics, wave–plasma interaction modeling, and real-time control–relevant measurement systems. I am excited by the opportunity to contribute to PSFC's disruptions research program, particularly in real-time MHD instability avoidance, hybrid physics–ML model development, and experimental validation on DIII-D and international tokamaks.

My research background combines experimental plasma physics, computational physics, and control-oriented diagnostic development. I have designed, implemented, and operated advanced laser, FIR, and millimeter-wave diagnostic systems on devices including NSTX-U, DIII-D, and EAST. These efforts required real-time data acquisition, robust automation, and integration with facility control architectures—experience that directly aligns with PSFC's mission to develop real-time solutions for tearing mode avoidance and disruption prevention.

In parallel, I have developed physics-based computational tools including a kinetic solver for runaway electron dynamics and a full-wave / beam-tracing model for wave propagation and mode conversion. These modeling efforts strengthened my ability to translate physical stability boundaries into quantitative metrics suitable for control algorithms. My recent work also includes machine-learning–assisted data interpretation and automated system alignment ("Sentry Mode"), giving me experience relevant to PSFC's goals of building hybrid physics + ML models that comply with FAIR data principles.

I am particularly motivated by this position's emphasis on real-time controllability quantification, tearing and neoclassical tearing mode avoidance in metallic-wall environments, and the integration of physics-based understanding with machine learning. The opportunity to contribute to real-time disruption mitigation strategies—working directly with GA, MIT, Columbia, UCSD, and UCI—fits perfectly with my multidisciplinary background and my long-term goal of advancing control solutions for high-performance tokamak operation.

I have extensive experience with scientific programming in Python, including numerical modeling, data pipelines, and automation. I am familiar with large-scale data management, and I have used C/C++ in control and hardware-integration contexts. I have a strong publication record, experience leading diagnostic campaigns, and a commitment to mentoring students, which I have practiced actively throughout my graduate and postdoctoral work.

I am excited by the opportunity to join the PSFC Disruptions Group and contribute both original research and practical improvements to the predictive and real-time control of MHD stability boundaries. I would welcome the chance to support and lead experimental efforts at DIII-D, develop and validate ML and physics-informed models, and collaborate closely with the broader multi-institutional team working toward disruption-free, high-performance tokamak operation.

Thank you very much for considering my application. I would be honored to contribute to the PSFC's research program and its broader mission of advancing fusion science.

Sincerely,
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