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Search Committee
Columbia Fusion Research Center

Dear Members of the Search Committee,

I am writing to apply for the **Post-Doctoral Research Scientist** position at the Columbia Fusion Research Center. With over nine years of experience in fusion plasma diagnostics and computational plasma modeling, and with hands-on work across major tokamak programs including **NSTX-U, EAST, and DIII-D**, I am excited about the opportunity to contribute to CFRC's research in tokamak, stellarator, and edge/boundary plasma physics.

In my current postdoctoral position at the University of California, Davis, I have led the design, development, and commissioning of multiple advanced diagnostic systems on the **NSTX-U spherical tokamak** at PPPL. These include the **Far-Infrared Tangential Interferometer/Polarimeter (FIReTIP)** and the **High-k Collective Scattering diagnostic**, where I was responsible for optical design, installation, thermal analysis, alignment automation, and LabVIEW-Python control integration. My work enabled significant improvements in real-time density measurements, fluctuation studies, and diagnostic reliability. I previously contributed to the development and operation of **Electron Cyclotron Emission Imaging (ECEI)** systems on the **EAST tokamak**, and I hold formal fusion safety training and 7+ years of experimental campaign experience.

Complementing my experimental background, I also developed a **kinetic simulation code** combining the spectral efficiency of the CODE solver with the modular structure of NORSE. This tool computes the time-dependent evolution of the electron distribution function in 0D–2P phase space, including collisions, synchrotron radiation, electric-field acceleration, and avalanche generation. I have used it to study non-thermal electron dynamics, runaway-electron physics, and emission processes such as the anomalous Doppler effect.

I am particularly excited about CFRC's mission to advance both **fundamental fusion science** and **industrial fusion research pathways**. My experience bridging diagnostics hardware, electromagnetic modeling, and physics interpretation is strongly aligned with these goals. In addition, I have a strong track record of mentoring students and junior researchers in both laboratory work and computational methods, and I would welcome the opportunity to contribute to the mentoring component of this role.

Thank you for considering my application. I would be honored to contribute my diagnostic expertise, simulation experience, and passion for fusion research to the Columbia Fusion Research Center. I would welcome the opportunity to discuss how my background can support your research programs.

Sincerely,
Xinhang Xu