

ERIC VAN CLEPPER
RATIONAL FOR UNIVERSITY OF WISCONSIN
PROPOSED MENTOR: KE ZHANG

I aim to work primarily with Dr. Ke Zhang at the University of Wisconsin Madison, who is an expert on observations of protoplanetary disk chemistry and its evolution throughout the disk lifetime. Professor Zhang's work with the AGE-PRO program would provide the ideal observational counterpart for my proposed research, and my work as a 51 Pegasi b fellow will coincide perfectly with the interpretation of new JWST MIRI data. While my models will provide a theoretical framework for understanding volatile gas emission from evolving disks, observational data is necessary for benchmarking and constraining the results of my models. This combined theoretical and observational approach will provide a cohesive and comprehensive view of the chemical implications of dust evolution within disks both with and without embedded planets.

In addition to my work with Professor Zhang, the University of Wisconsin has a thriving exoplanet and disk community, that will lead to many fruitful collaborations. My work connecting disk chemistry to exoplanet atmospheres has direct connections for work by Professors Thomas Beatty and Juliet Becker. Their expertise in exoplanet atmospheres and dynamics will be important resources for connecting my disk evolution models with evolved exoplanet architectures. Outside of the department of Astronomy, Professors Susanna Widi-cus Weaver and Zoe Todd will be instrumental in developing the chemical models, with emphasis on the importance of ice phase chemistry.

I am particularly excited for the opportunity to use the new Wisconsin Center for Origins Research (WiCOR) as a resource to continue my work in understanding PPD processes for the origin of life. Given my background in cosmochemistry and planet formation, I am excited to learn from the interdisciplinary network of researches and expand my knowledge of prebiotic chemistry and processes relevant to the Origin of Life. I also hope that my expertise in meteoritics and evolution in the Solar Nebula will be a welcome addition to the work already underway in WiCOR.

The main resource required for my research is access to computational resources necessary for my simulations. As a fellow at UW-Madison I will have access to the Center for High Throughput Computing (CHTC), ensuring sufficient computing power using the center's high performance computing cluster. Through the CHTC I will have access to both CPU and GPU resources in addition to ample storage space and memory necessary for analysis of my expected results.

Finally, I look forward to the many opportunities offered by the University of Wisconsin to further my work in STEM education. This includes the option to further develop my skills in STEM education through WISCIENCE, which offers courses and programs on effective STEM education and pedagogy. I will also have opportunities to mentor undergraduates and highschool students both at the University and in the surrounding Madison area.

The University of Wisconsin Madison is an ideal fit for me, both scientifically and professionally. I look forward to the opportunity to not only connecting my theoretical work with observational data, but to also expand my knowledge in exoplanet, astrochemical, and origins of life sciences. I have no doubt that I will be able to excel in my career as a 51 Pegasi b fellow here.