ERIC VAN CLEPPER
RATIONAL FOR HARVARD-SMITHSONIAN CFA
PROPOSED MENTOR: KARIN ÖBERG

I aim to work primarily with Dr. Karin Öberg at the Harvard-Smithsonian Center for Astrophysics, who is an expert on both observations of protoplanetary disks and laboratory experiments. Professor Öberg's work with the MAPS data set in particular would provide an ideal observational counterpart for my theoretical work. My models will provide a framework for interpreting this molecular emission in the context of a giant planet's influence on the disk environment. In addition to her observational work, Professor Öberg is also an expert in laboratory experiments of astrochemically relevant ice-phase chemistry. This ice phase chemistry provides a promising pathway for the formation of complex organic molecules, possibly relevant to the origin of life in the Solar Nebula. My expertise in protoplanetary disk dynamics, evolution, and modeling will provide a highly complimentary skill set to Professor Öberg's expertise in PPD observations, chemical modeling, and laboratory experiments. I am confident that working with Dr. Karin Öberg will lead to fruitful scientific results and that she will serve as an exceptional advisor and mentor.

In addition to my work with Professor Öberg, the Harvard-Smithsonian CfA is home to a thriving exoplanet, disk, and chemistry community, with opportunities for many collaborations during my time there. Sean Andrews, for example, is an expert in disk observations and is at the forefront of understanding the sample of disks containing substructures. I am confident that my dynamic disk models combined with his extensive knowledge of substructured disks will lead to novel contributions to our understanding of disk evolution. In addition to this work in disks, the CfA is also home to many experts in planet formation and characterization I am excited to collaborate with, including Dimitar Sasselov, David Wilner, David Charbonneau, and Mercedes López-Morales.

Outside of exoplanetary science, I look forward to potential collaborations with a wide range of scientists through the Harvard Origins of Life initiative. 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.

The main resource required for my research is access to computational resources necessary for my simulations. As a 51 Pegasi b fellow at the CfA, will have access to more than sufficient computing power through the resources offered. The Institute for Theory and Computation within the Theoretical Astrophysics division contains a high performance computing cluster which I can use in addition to general computing resources for researchers within the CfA and Harvard communities. Using these resources, I will have access to both CPU and GPU processors necessary for my simulations in addition to ample storage and memory for analysis of my expected results.

Finally, I look forward to the many opportunities through the CfA to continue my work in STEM education and outreach to underrepresented communities in planetary science. The CfA offers both informal and formal opportunities to mentor students, including the Science Research Mentoring Program. Through this program, I will work with high school students, giving them the opportunity to become involved in active research in planetary science, laying the groundwork for these students to join the field in the future.

I have no doubt that I will thrive as a 51 Pegasi b fellow at the CfA. Through the combination of rigorous scientific research, wide breadth of topics, and opportunities for outreach I will grow as a researcher, scientist, and educator, enabling me to successfully complete my research goals.