Harvard University
60 Garden Street, MS-10
Cambridge, MA 02138

December 11th, 2015

Professor Sara Seager
Chair, Juan Carlos Torres Fellowship Selection Committee
Massachusetts Institute of Technology

Dear Professor Seager and Members of the Selection Committee:

I am responding to your website's advertisement to apply for a Juan Carlos Torres Postdoctoral Fellowship at the Massachusetts Institute of Technology. I am currently a graduate student in the Harvard University Department of Astronomy and I will obtain my Ph.D. in May 2016. My research interests cover several aspects of planet formation and composition in the context of protoplanetary disk evolution. As a Torres Postdoctoral Fellow, I believe I can contribute to MIT's academic excellence through my research ideas and expertise, and by fostering collaborations with experts in the field, both in the Physics and Earth, Atmospheric and Planetary Sciences Departments.

More than one thousand extrasolar planets have been discovered within the past two decades, and their diversity in terms of mass, radius, location and composition provides an exciting field of research. For this purpose, it is thus crucial to explore and understand how planets obtain their compositions. Planets are born in protoplanetary disks, which means that their compositions are determined by and tightly linked to the structure and composition of the disk. However, the disk-planet connection, both from a dynamical and chemical perspective, has not yet been considered in detail. For my postdoctoral research, I will develop a holistic chemo-dynamical framework to explore how disk chemistry and dynamics, as well as the dynamics of nascent planets and planetesimals, regulate the compositions of mature giant planets. MIT is the best place for me to pursue this research, due to its opportunities for valuable collaborations with experts in protoplanetary disks and exoplanets, such as Prof. Sara Seager, a world-leading theorist in atmospheric chemistry, or Prof. Hilke Schlichting, an expert in planet formation theory and dynamics. Moreover, MIT is home to leaders of the Transiting Exoplanet Survey Satellite (TESS) mission, such as Dr. George Ricker and Prof. Seager. The predictions of my theoretical research outlined above will be able to refine the parameter space where TESS should search for giant planets, observations that will eventually be followed up by the James Webb Space Telescope. I thus believe my theoretical work can prove valuable for the success of TESS.

In the attached documents I have enclosed a statement of my research plans as a Torres Postdoctoral Fellow as well as a statement of my current research, a copy of my curriculum vitae, and a list of my publications. If you require additional information, please contact me via email.

Sincerely,

Ana-Maria Piso