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The Planet Formation Imager Project

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Abstract

Among the most fascinating and hotly-debated areas in contemporary astrophysics are the means by which planetary systems are assembled from the large rotating disks of gas and dust which attend a stellar birth. Although important work is being done both in theory and observation, a full understanding of the physics of planet formation can only be achieved by opening observational windows able to directly witness the process in action. The key requirement is then to probe planet-forming systems at the natural spatial scales over which material is being assembled. By definition, this is the so-called Hill Sphere which delineates the region of influence of a gravitating body within its surrounding environment. The Planet Formation Imager project has crystallized around this challenging goal: to deliver resolved images of Hill-Sphere-sized structures within candidate planet-hosting disks in the nearest star-forming regions.

In this contribution we outline the primary science case of PFI and discuss how PFI could significantly advance our understanding of the architecture and potential habitability of planetary systems. We present radiation-hydrodynamics simulations from which we derive preliminary specifications that guide the design of the facility. Finally, we give an overview about the interferometric and non-interferometric technologies that we are investigating in order to meet the specifications.