The New Worlds Imager

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We propose a two year, Phase II study of the New Worlds Imager concept. In Phase I we showed how the concept of a starshade has the potential to make studies of planets around other stars routine, without technical heroics. The starshade is a large, deployable sheet on a separate spacecraft that is flown into position along the line of sight to a nearby star. We showed in Phase I how a starshade could be designed and built in a practical and affordable manner to fully remove starlight and leave only planet light entering a telescope. The simulations are very exciting, showing we can detect planetary system features as fine as comets, perform spectroscopy to look for water and life signs, and perform photometry to search for oceans, continents, clouds and polar caps. We also show how a true Planet Imager can be made from two starshade apertures and a fifth spacecraft carrying an interferometer. In Phase I we showed through simulation that features as fine as 100km across can be detected and mapped from 30 light years with this New Worlds Imager.

We propose to continue the study of the New Worlds concept into Phase II. We will fully define the approaches to building starshades and telescopes. This will include identification of materials, deployment methods, target acquisition techniques, thrusters for holding spacecraft alignment, available launch vehicles and ideal orbits. The study will also include a laboratory demonstration of high contrast using a shaped pupil. We expect to solve all the remaining problems and publish our results. We will continue the studies into a full roadmap to the New Worlds Imager. The