V04a Subaru HiCIAO High Contrast Imager: Performance Review

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The ground-based direct observation of extra-solar planets is of extreme difficulty, mainly due to the atmospheric perturbations on the wavefront. The use of an improved adaptive optics system on the Subaru (NGAO188 with 188 actuators) will greatly enhance the PSF quality. However, when combined with a coronagraph, this image quality is still too low to achieve very high contrast: the atmospheric noise (or speckle noise) will still be a dominant source of noise. The HiCIAO will use the so-called "simultaneous differential imaging" technique which permits a high degree of speckle noise attenuation by subtracting two images recorded simultaneously at two adjacent wavelengths. In this presentation, I will review the performance of the HiCIAO through a complex modeling including various instrumental effects as well as atmospheric and AO compensated wavefront. These simulations, along with the expected improvement from new coronagraphic techniques show that the goal contrast of 10^4 to 10^6 from 0.1" to 1.0" can be realistically envisaged.