

Results from a Direct Imaging Search for Disks and Planets around A/F-stars in Scorpius-Centaurus

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Resolving debris disks with high contrast AO imaging and mapping their structures can reveal dynamical signatures of undetected companions, extending below the current limits of direct imaging. We present the first spatially resolved images of debris disks around three young A-stars and one young F-star in the OB Association Scorpius-Centaurus. The four debris disks were imaged using the Gemini Planet Imager (GPI) on the Gemini South Telescope. The three debris disks imaged around the stars HD 111161, HD 143675, and HD 145560 are symmetric in both brightness and structure. The disk resolved around the star HD 98363 has asymmetries in both brightness distribution and structure. The four disks range in inclination from 44 to 87 degrees and outer radii of 54 to 224 AU. We also searched for imaged planets within the GPI field-of-view, which was sensitive to 18 AU to 155 AU, but did not detect any candidate companions. Based on the contrast ratios that were as deep as 3×10^{-6} and assuming hot-start evolutionary models, the detection limits were ~ 2 -3 Jupiter masses in orbits wider than 0.8 arcseconds (~ 88 AU) and ~ 5 Jupiter masses planets at angular separations greater than 0.5 arcseconds (~ 69 AU) around each of the four target stars. Although there were no companions imaged within the GPI field, the target HD 98363 with the asymmetric disk has a wide comoving stellar companion, Wray 15-788. Since the co-moving companion also has an imaged disk, HD 98363 A/B is the first debris disk system in a binary with two spatially resolved disks. Overall, the four newly resolved disks contribute to the census of disk structures measured around A/F stars at this early phase (~ 10 -20 Myr) in the development of planetary systems formed in a common environment.