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Substellar Objects in Nearby Young Clusters (SONYC) II: The Brown Dwarf Population of Rho Ophiuchi

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SONYC - Substellar Objects in Nearby Young Clusters - is a survey program to investigate the frequency and properties of brown dwarfs down to masses below the Deuterium burning limit in nearby star forming regions. In this second paper, we present results on the ~1 Myr old cluster Rho Ophiuchi, combining our own deep optical and near-infrared imaging using Subaru with photometry from the 2-Micron All Sky Survey and the Spitzer Space Telescope. Of the candidates selected from iJKs photometry, we have confirmed three -- including a new brown dwarf with a mass close to the Deuterium limit -- as likely cluster members through low-resolution infrared spectroscopy. We also identify 27 sub-stellar candidates with mid-infrared excess consistent with disk emission, of which 16 are new and 11 are previously spectroscopically confirmed brown dwarfs. The high and variable extinction makes it difficult to obtain the complete sub-stellar population in this region. However, current data suggest that its ratio of low-mass stars to brown dwarfs in similar to those reported for several other clusters, though higher than what was found for NGC 1333 in Scholz et al. 2009.

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