Observing Debris disks with the ELT-HARMONI instrument

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Abstract

HARMONI is the first light visible and near-IR integral field spectrograph for the ELT. It covers a large spectral range from 450nm to 2450nm with resolving powers from 3500 to 18000 and spatial sampling from 60mas to 4mas. It can operate in two Adaptive Optics modes - SCAO (including a High Contrast capability) and LTAO - or with NOAO. The SCAO system will feed a High-Contrast Module that will allow the direct spectroscopy from 1.25 to 2.45microns of sources at high contrast ratio with their host star. Its prime science case focuses on young giant exoplanets at contrasts up to 16mag with their host star down to separations of 75mas.
One of the other possible science cases for the High-Contrast Module is the direct spectroscopy of bright debris disks, for which HARMONI could measure scattered-light reflectance spectra, a key information to constrain the grain size distribution and composition in those systems. With its greater angular resolution and smaller inner working angles compares to VLT instruments, ELT-HARMONI has the capability to explore the inner parts of debris disks across the ice line for systems within 25pc, a region where giant planets are expected to form. High angular resolution and spectrally dispersed measurements of extended, resolved objects put however strong contraints on the brightness of the disk. Here we present a preliminary sensitivity analysis of HARMONI for the disk science case.

Keywords: High, contrast imaging, coronagraphy, debris disks

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