The Hunt for Observable Signatures of Terrestrial Planetary Systems (HOSTS)

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Abstract: The presence of large amounts of exozodiacal dust around nearby main sequence stars is considered as a potential threat for the direct imaging of Earth-like exoplanets and, hence, the search for biosignatures (Roberge et al. 2012). However, it is also considered as a signpost for the presence of terrestrial planets that might be hidden in the dust disk (Stark and Kuchner 2008). Characterizing exozodiacal dust around nearby sequence stars is therefore a crucial step toward one of the main goals of modern astronomy: finding extraterrestrial life.

After briefly reviewing the latest results in this field, we present the exozodiacal dust survey on the Large Binocular Telescope Interferometer (LBTI). The survey is called HOSTS and is specifically designed to determine the prevalence and brightness of exozodiacal dust disks with the sensitivity required to prepare for future New Worlds Missions that will image Earth-like exoplanets. To achieve this objective, the LBTI science team has carefully established a balanced list of 50 nearby main-sequence stars that are likely candidates of these missions and/or can be observed with the best instrument performance (see companion abstract by Roberge et al.). Exozodiacal dust disk candidates detected by the Keck Interferometer Nuller will also be observed. The first results of the survey will be presented.

To precisely detect exozodiacal dust, the LBTI combines the two 8-m primary mirrors of the LBT using N-band nulling interferometry. Interferometric combination provides the required angular resolution (70-90 mas) to resolve the habitable zone of nearby main sequence stars while nulling is used to subtract the stellar light and reach the required contrast of a few 10^{-4}. A K-band fringe tracker ensures the stability of the null. The current performance of the instrument and the first nulling measurements will be presented.

References:

Roberge et al. 2012, PASP 124, 799
Stark and Kuchner 2008, ApJ 686, 637

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