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Colors of extreme exoEarth environments

S. Hegde (1) and L. Kaltenegger (1,2)

(1) Max Planck Institute for Astronomy, Koenigstuhl 17, 69917 Heidelberg, Germany (hegde@mpia.de), (2) Harvard-Smithsonian Center for Astrophysics, OIR, Cambridge, United States (lkaltene@cfa.harvard.edu, 617 496-0121)

The color of a planet is likely to be the first post-detection quantity to be measured for the case of direct detection of an extrasolar rocky planet in the future. Although spectroscopic studies provide detailed characteristics of a planet, the low signal-to-noise ratios that are presently achievable, limit spectroscopic measurements of distant extrasolar worlds. Filter photometry on the other hand, requires relatively low exposure times and therefore serves well as a first line of characterization for planets orbiting around distant stars. The color of a planet reveals a host of important planetary properties. Of particular interest in this regard is the characterization of the surface features that make up a planet. It is known that different surfaces on the Earth have characteristic albedos and therefore one can distinguish these surface environments of rocky planets in the visible waveband even with the help of a low-resolution color-color diagram.

On Earth, extremophiles have been known to thrive under extremes of physical and geochemical conditions that are otherwise uninhabitable to most life forms. They provide us with the minimum envelope of environmental limits whilst looking for life elsewhere on a potentially habitable planet. In this talk, using a low-resolution characterization, we link the different remotely detectable surface features to the extreme forms of life that such environments could potentially harbor for cases of an aerobic as well as an anaerobic atmosphere.