

Habitable planets, M dwarfs and NIR spectrographs

(A proposal for a satellite meeting at the Pathways 2015 conference)

Proposers

José A. Caballero (Centro de Astrobiología, Madrid)

Ravi K. Kopparapu (Penn State)

Suvrath Mahadevan (Penn State)

Rationale

The last decade has witnessed an extraordinary progression in the field of exoplanetary science. The rate of exoplanet discovery has continued to increase as the sensitivity to smaller planets has dramatically improved. As a complement to exoplanet transit surveys from space, precise radial-velocity (PRV) with spectrographs on the ground also push the detection limit towards “earth twins”: exoplanets of about one Earth mass in the habitable zone of other stars.

Current PRV instrument developments tend to use fibre-fed highly-stabilised spectrographs at large telescopes and with state-of-the-art wavelength calibration devices. Besides, planets around M-dwarf low-mass stars should be more easily detected with the Doppler technique. In spite of the ubiquity and longevity of M dwarfs, they also show impediments to PRV searches: faintness in the visual and relatively high stellar activity, but which can be partly overcome with spectrographs operating in the near-infrared. Tidal locking and the subsequent effect on the exoplanet atmosphere are also limitations to the habitability of M-dwarf planets.

We propose a three-day satellite meeting to cover all the topics that go from tidal locking and atmosphere circulation models, through M-dwarf activity, planet atmosphere chemistry and biosignatures, to a comprehensive review of all big PRV projects in the near-infrared. For these reviews, we will count with some of the major experts in their respective topics. The first half of the three-day satellite meeting will focus on the scientific areas, while the second half will do on the technological ones. Special emphasis will be given to the latest developments in wavelength calibration in the near-infrared. All invited speakers, from USA, Canada, Spain, France, Japan, Italy, Chile, Australia and Germany, have confirmed their participation at Pathways 2015.

We believe that our initiative fairly matches the main objective of the conference, which is “phasing” astrophysicists, planetary scientists and instrument scientists (and biologist) for the search and characterisation of habitable planets.

The website of our satellite meeting can be found at <http://carmenes.caha.es/ext/conferences/pathways2015/>, where we set the lay out of our satellite meeting as well as our schedule of invited talks. If our satellite meeting is confirmed, we will make available short abstracts for each

talk. Besides, as a legacy after the conference, we will upload all presentations in pdf in our site.

We have coordinated our proposal and the organisation of our first session (in particular, the sequence of the topics) with the satellite meeting “Validation and compilation of *Kepler* habitable zone candidates”, proposed by Nader Haghighipour. To ensure connectivity and coherence in the topics and presentations of our two sessions, we request our satellite meeting to be scheduled in conjunction with the *Kepler* Habitable Zone Working Group’s one for Monday, July 13 at 14:00. We request a room with 90 seats. We may go on using this large room for Part II of our satellite meeting on Tuesday, 14 July, because of the wide range of covered topics (from stars, through planets, to major international instrument projects), which may be of general interest to participants at Pathways 2015. We might use the same 90-seat room on Wednesday, 15 July at 14:00 for continuity, but we are free to iterate with the Pathways 2015 LOC if they prefer a smaller one.