

September 17th
Amaury Triaud

Exploiting the diversity of exoplanetary systems, to improve our odds of finding another Earth

From the first discoveries and over nearly 20 years of search, we have uncovered that exoplanets present a wide variety in every parameter we can measure. Those discoveries imply that our Solar system did not participate in the dominant planet formation and evolution mechanism in the Galaxy. Understanding this diversity remains one of the main drivers behind the search for other worlds. Exploiting some key observable properties of what at first appeared like exotic systems, can enhance our exploration of how varied planets are. Certain exoplanet properties can be exploited to significantly improve our odds of discovering planets suitable for atmospheric characterisation.

I will briefly describe some of the methods employed for the detection of exoplanets and the type of measures that allow us to characterise those systems and their atmospheres. Notably, observations of the Rossiter-McLaughlin effect revealed that many gas giants do not occupy orbits coplanar with their star's equator. Building on that knowledge I will explore how inclined planets behave when orbiting close binary stars and the interesting consequences this property has on their probability to transit and on our capacity to study their atmospheres.

Then, I will describe how expanding planet discoveries to very low mass stars and brown dwarfs is essential. Their characteristics allow the detection of habitable-zone, telluric planets. When found, we will be able, for the first time in history, to test whether other environments can be habitable, moving from theoretical considerations to empirical verification.