



EPSC Abstracts

Vol. 14, EPSC2020-412, 2020

<https://doi.org/10.5194/epsc2020-412>

Europlanet Science Congress 2020

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



## Constraining planet formation around 6-8 $M_{\odot}$ stars

**Dimitri Veras**<sup>1,2</sup>, Pier-Emmanuel Tremblay<sup>2</sup>, James Hermes<sup>3</sup>, Catriona McDonald<sup>1,2</sup>, Grant Kennedy<sup>1,2</sup>, Farzana Meru<sup>1,2</sup>, and Boris Gänsicke<sup>1,2</sup>

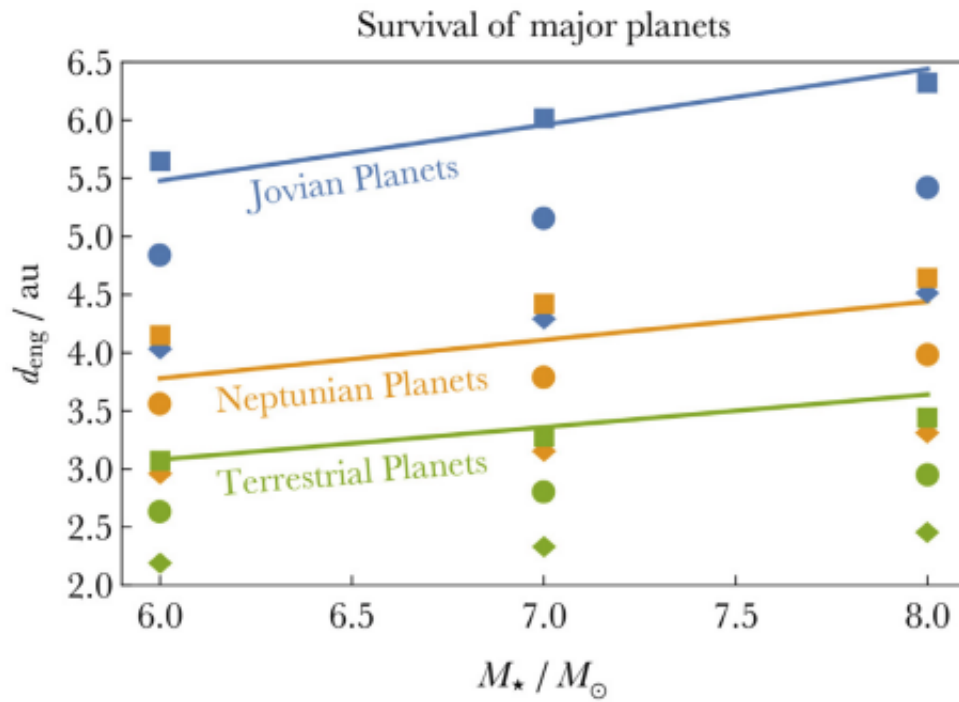
<sup>1</sup>Centre for Exoplanets and Habitability, University of Warwick, Coventry CV4 7AL, UK

<sup>2</sup>Department of Physics, University of Warwick, Coventry CV4 7AL, UK

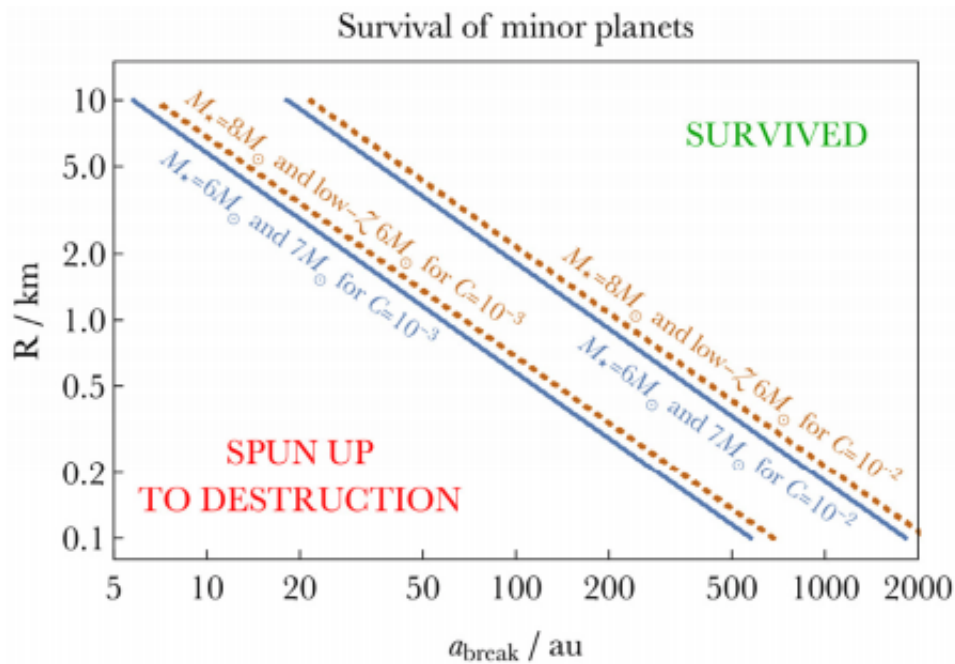
<sup>3</sup>Department of Astronomy, Boston University, 725 Commonwealth Ave., Boston, MA 02215, USA

Identifying planets around O-type and B-type stars is inherently difficult; the most massive known planet host has a mass of only about  $3 M_{\odot}$ . However, planetary systems which survive the transformation of their host stars into white dwarfs can be detected via photospheric trace metals, circumstellar dusty and gaseous discs, and transits of planetary debris crossing our line of sight.

These signatures offer the potential to explore planet formation efficiency and chemical composition for host stars with masses up to the core-collapse boundary at  $\approx 8 M_{\odot}$ , a mass regime rarely investigated in planet formation theory. Here, we establish limits on where both major and minor planets must reside around  $\approx 6-8 M_{\odot}$  stars in order to survive into the white dwarf phase. For this mass range, we find that intact terrestrial or giant planets need to leave the main sequence beyond approximate minimum star-planet separations of, respectively, about 3 and 6 au, as shown here:



Further, in these systems, rubble pile minor planets of radii 10, 1.0, and 0.1 km would have been shorn apart by giant branch radiative YORP spin-up if they formed and remained within, respectively, tens, hundreds, and thousands of au, as shown here:



Overall, we find that planet formation around 6  $M_\odot$ -8  $M_\odot$  stars may be feasible, and hence we encourage dedicated planet formation investigations for these systems.

