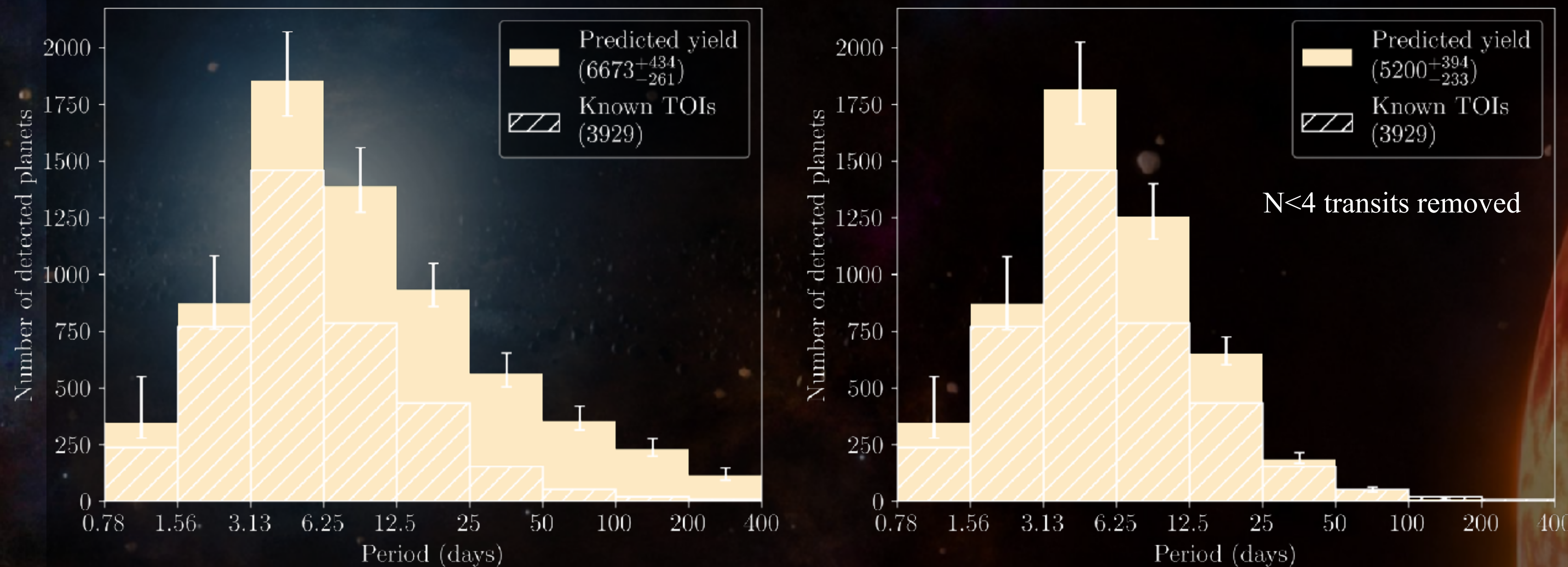


Discovering hidden long-period planets with TESS

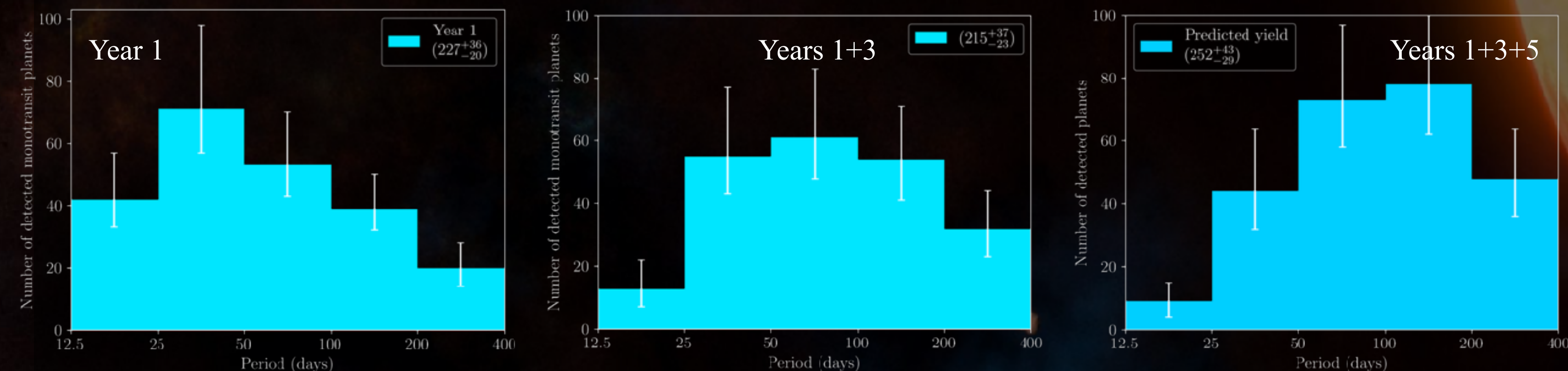
Toby Rodel, Christopher A. Watson, Daniel Bayliss, Samuel Gill, Solene Ulmer-Moll, et al.,



Yield predictions with TlaRA



We performed updated yield predictions with the Transit Investigation and Recoverability Application (TlaRA^[1]) on TESS-SPOC data^[2,3,4]. We find good agreement between our predictions and the TESS Object of Interest (TOI^[5]) catalogue for short periods but see an increasing deficit for longer periods. This deficit disappears when we only allow detections with four or more transits, implying a wealth of undiscovered long-period planets in TESS data discovered with just one, two, or three transits.



We find that the overall number of monotransits does not change within errors as TESS revisits the same field. However the distribution shifts to increasingly long periods with each visit.

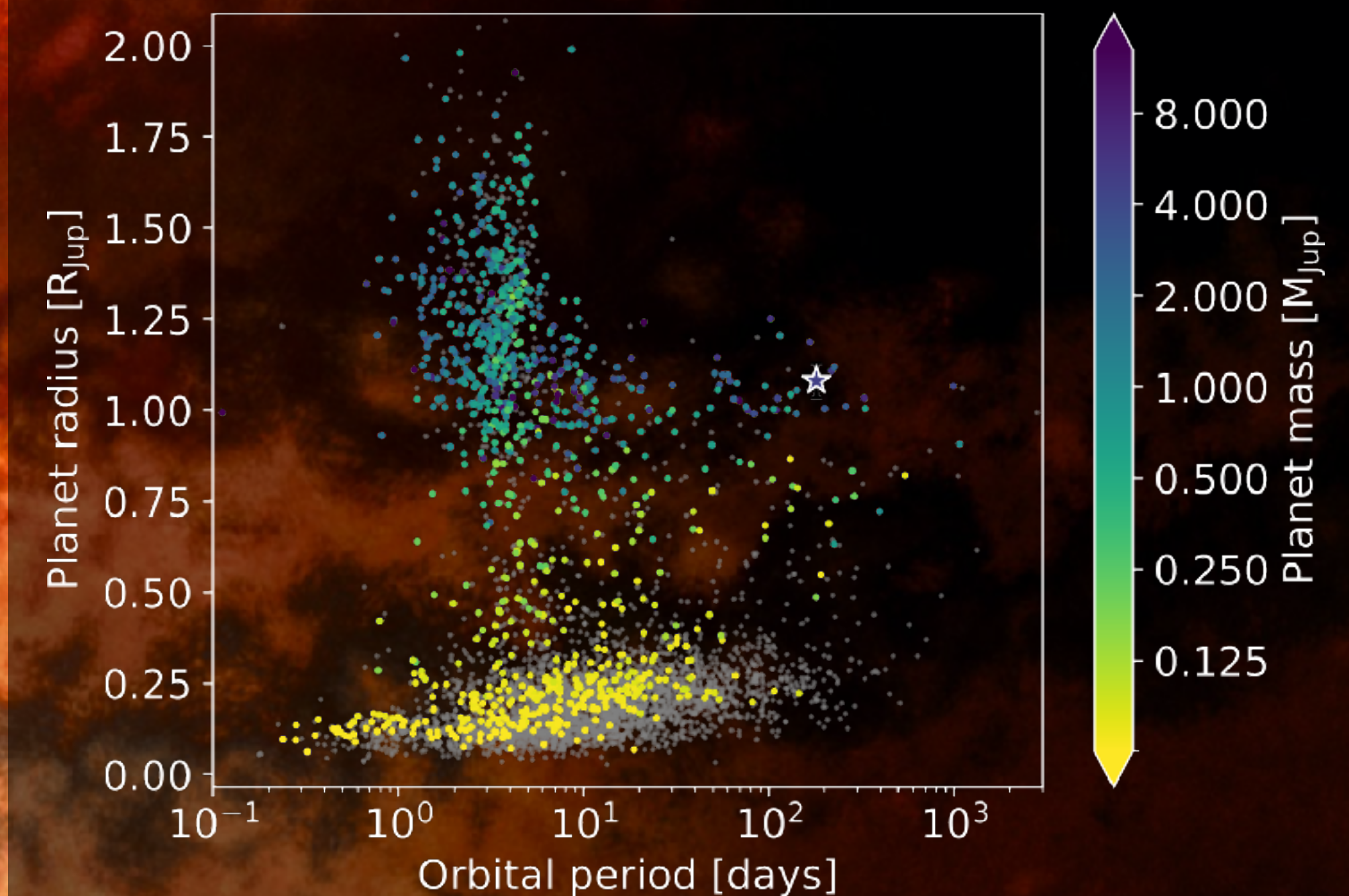
References:

- [1] Rodel, T., et al. (2024), MNRAS, 529(1), 715-731
- [2] Ricker, G. R., et al. (2015), JATIS, 1, 014003
- [3] Jenkins, J. M., et al. (2016), SPIE, 9913 99133E
- [4] Caldwell, D. A., et al. (2020), RNAAS, 4(11), 201
- [5] Guerrero, N. M., et al. (2021), ApJS, 254(2), 39

- [6] Rodel, T., et al. (2026), MNRAS, 549(4), stag1061
- [7] Rojas, F. I., et al. (2026), arXiv, arXiv:2602.13125
- [8] Wheatley P.J., et al. (2018), MNRAS, 475(4), 4476-4493
- [9] Mayor, M., et al. (2003), Msngr, 114 20-24
- [10] Queloz, D., et al. (2001), Msngr, 105 1-7

Background: Artist's impression of NGTS-38 b. Credit: Soheb Mandai

NGTS-38 b



An example of one of the missing long-period planets we predict is NGTS-38 b^[6,7]. It was detected in TESS from a single transit on the 25th of December 2020 before an extensive follow-up campaign was launched. Using photometry from the Next Generation Transit Survey (NGTS^[8]) and spectroscopy from the High Accuracy Radial Velocity Planet Searcher (HARPS^[9]) and CORALIE^[10], we were able to characterise the planet as a super-Jovian ($\sim 5 M_{\text{Jup}}$) giant planet with a 180.5 day orbit.



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