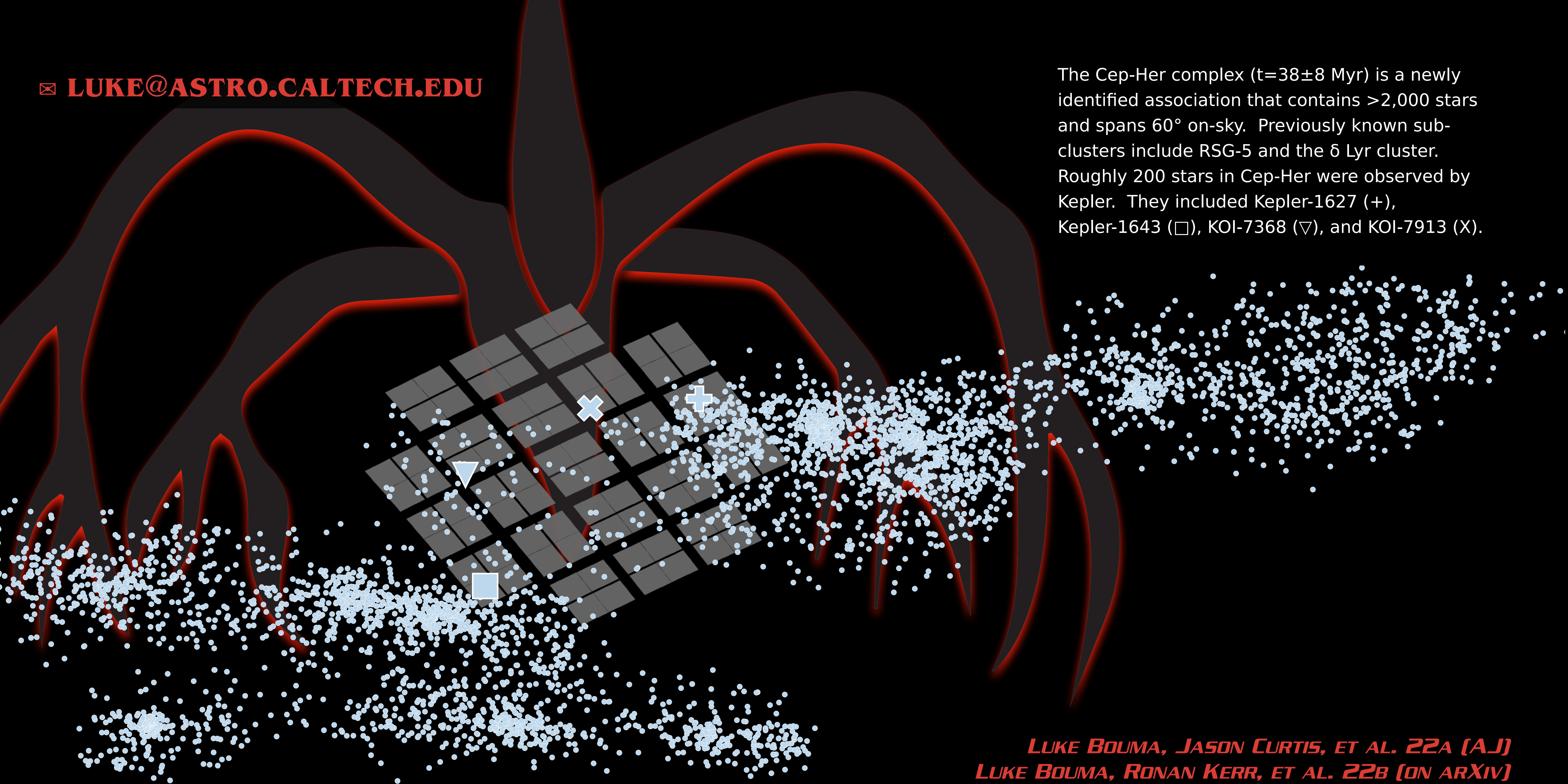


The Cep-Her complex ($t=38\pm 8$ Myr) is a newly identified association that contains $>2,000$ stars and spans 60° on-sky. Previously known sub-clusters include RSG-5 and the δ Lyr cluster. Roughly 200 stars in Cep-Her were observed by Kepler. They included Kepler-1627 (+), Kepler-1643 (\square), KOI-7368 (∇), and KOI-7913 (X).



LUKE BOUMA, JASON CURTIS, ET AL. 22A (AJ)
LUKE BOUMA, RONAN KERR, ET AL. 22B (ON ARXIV)



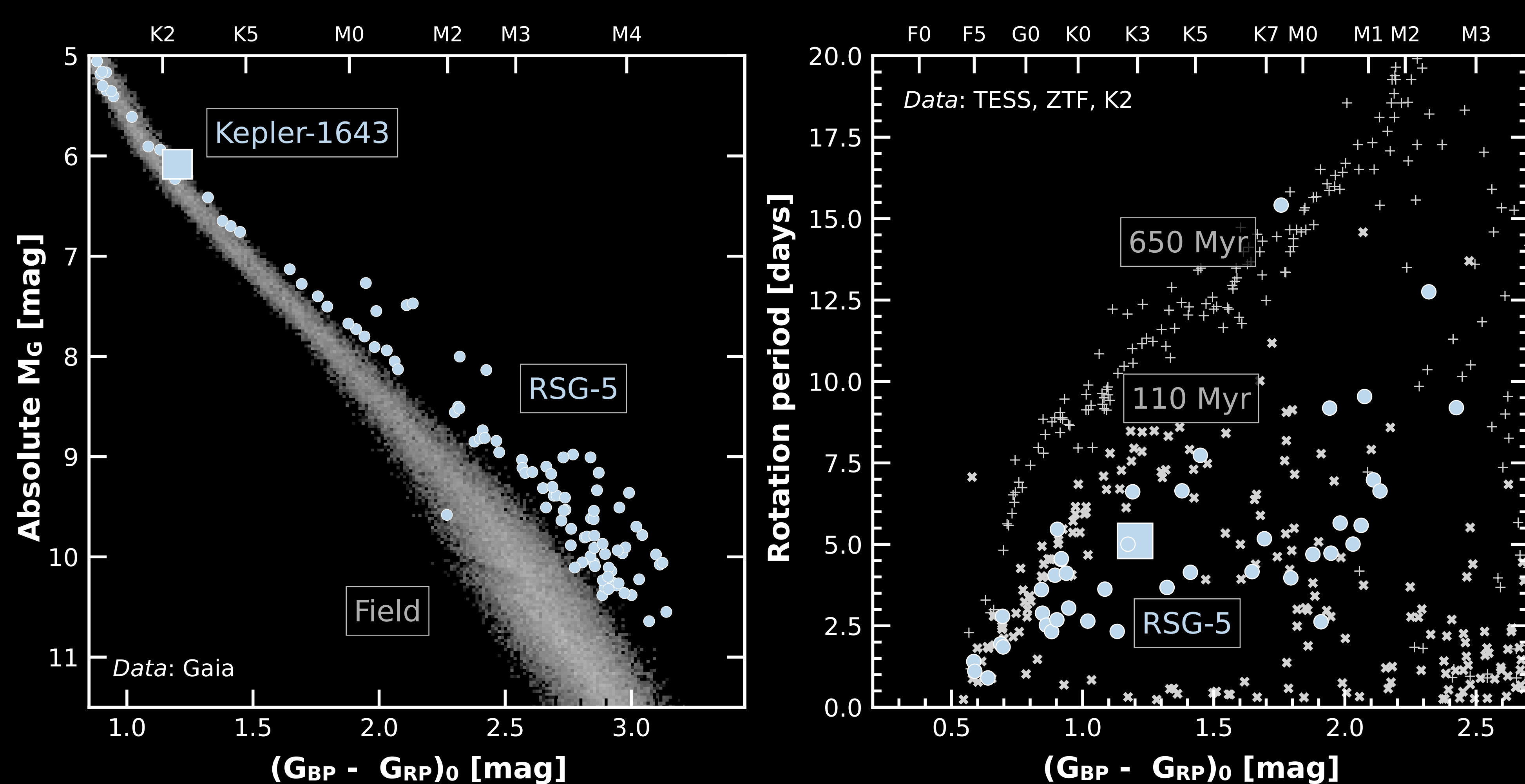
KEPLER AND THE BEHEMOTH

BACKGROUND

- At $<10^8$ years (<100 Myr), the radius valley should not exist. Instead, most mini-Neptunes, including those destined to lose their primordial atmospheres, should be 2 - 3 R_\oplus in size (e.g., Rogers & Owen 21).
- Given this expectation, it is **STRANGE** that most known transiting planets younger than $<10^8$ years have sizes between 4 and 10 R_\oplus . The one previous exception was AU Mic c ($\approx 3 R_\oplus$, Martioli+21; Gilbert+22).
- The super-Neptune excess could be a sign of planetary cooling. However, it could also be a selection effect: it is hard to detect small planets around young, spot-dominated stars.

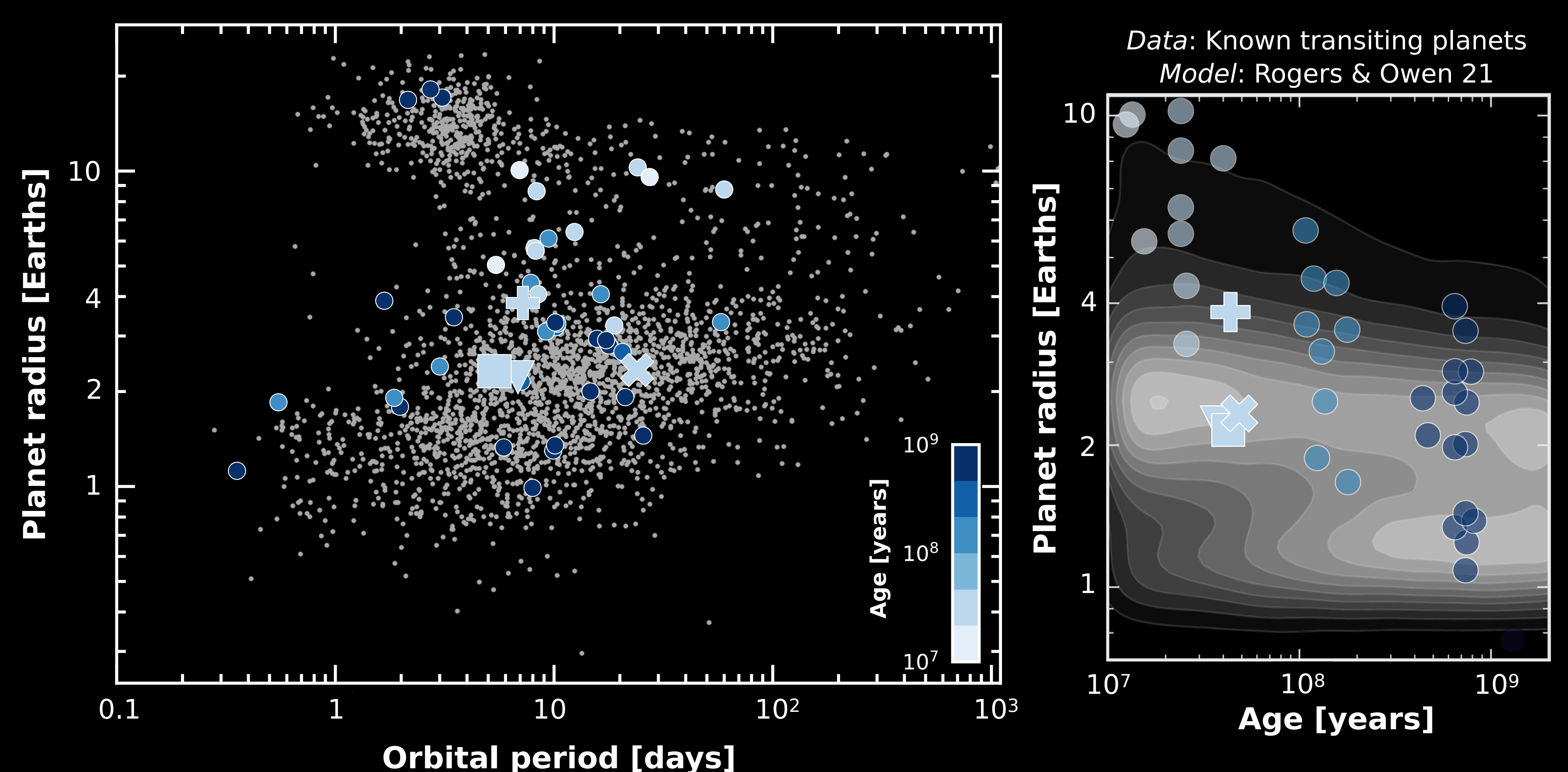
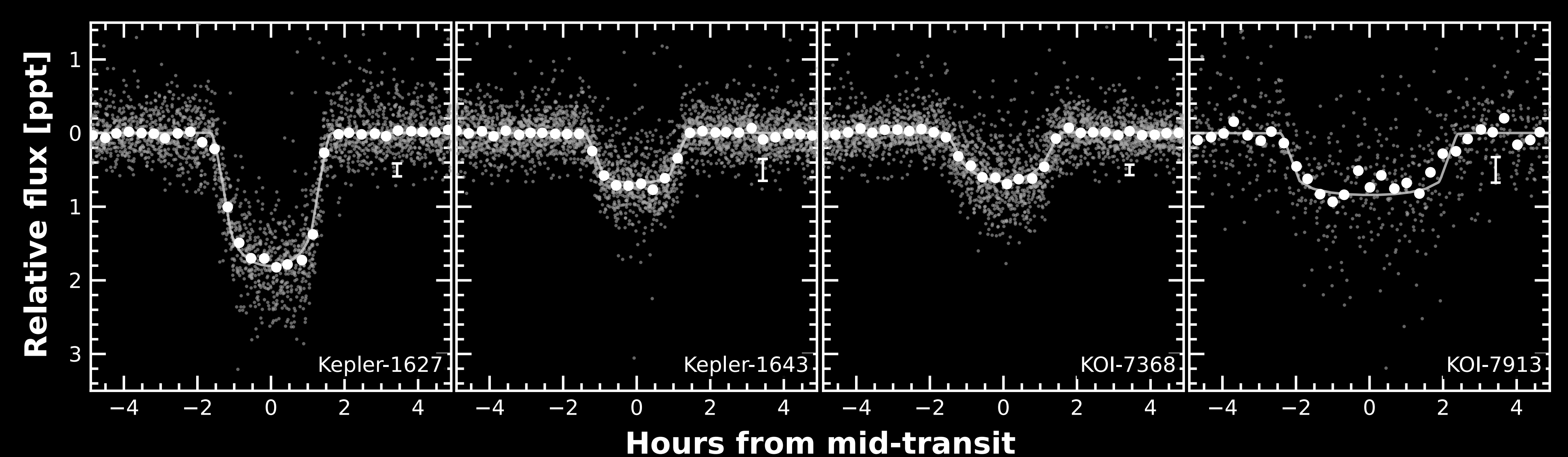
AIM & METHODS

- We set out to expand the population of young, small, planets by crossmatching new star clusters from Gaia against the Kepler field.
- We clustered on Gaia $\{X, Y, Z, v_b, v_l\}$ to refine candidate members per Kerr+21.
- We verified the results using Gaia HRDs, TESS rotation periods, and spectra.



RESULTS & DISCUSSION

- Cep-Her complex exists ($t=38\pm 8$ Myr; $d=330$ pc). SPYGLASS 1 kpc expansion (R. Kerr+ in prep) will detail its kinematic structure and potential origin.
- Cep-Her contains four validated Kepler planets. $R_p=2-4R_\oplus$, $P=5-25$ days.



- The Cep-Her planets show that mini-Neptunes with sizes of 2 R_\oplus exist by 40 Myr.
- Future areas of interest include measuring mini-Neptune occurrence as a function of time, detecting rocky planets at $<10^8$ year ages, and characterizing the atmospheres and orbital geometries of these young planets.