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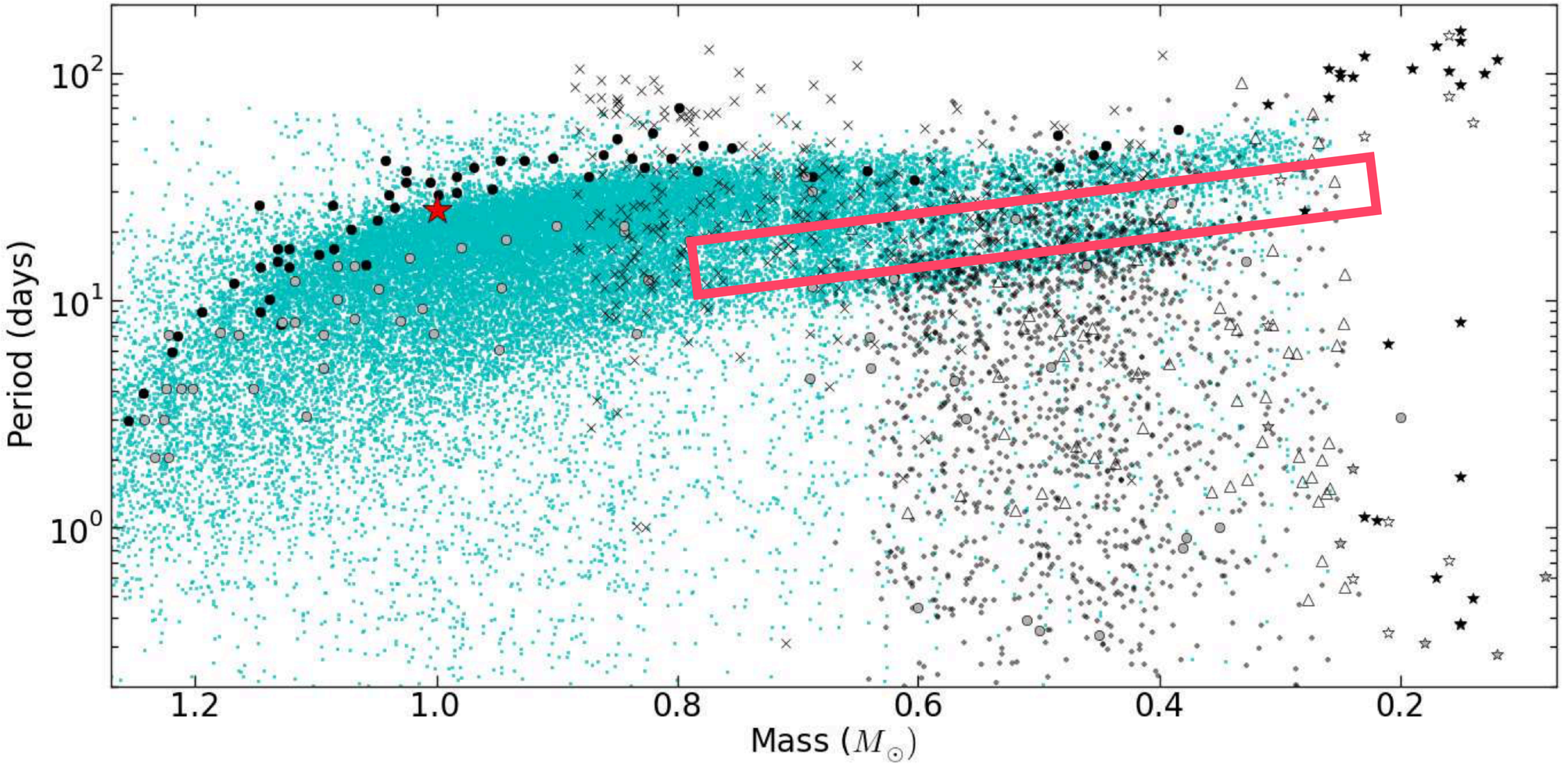
Exostar Redux
August 26, 2020

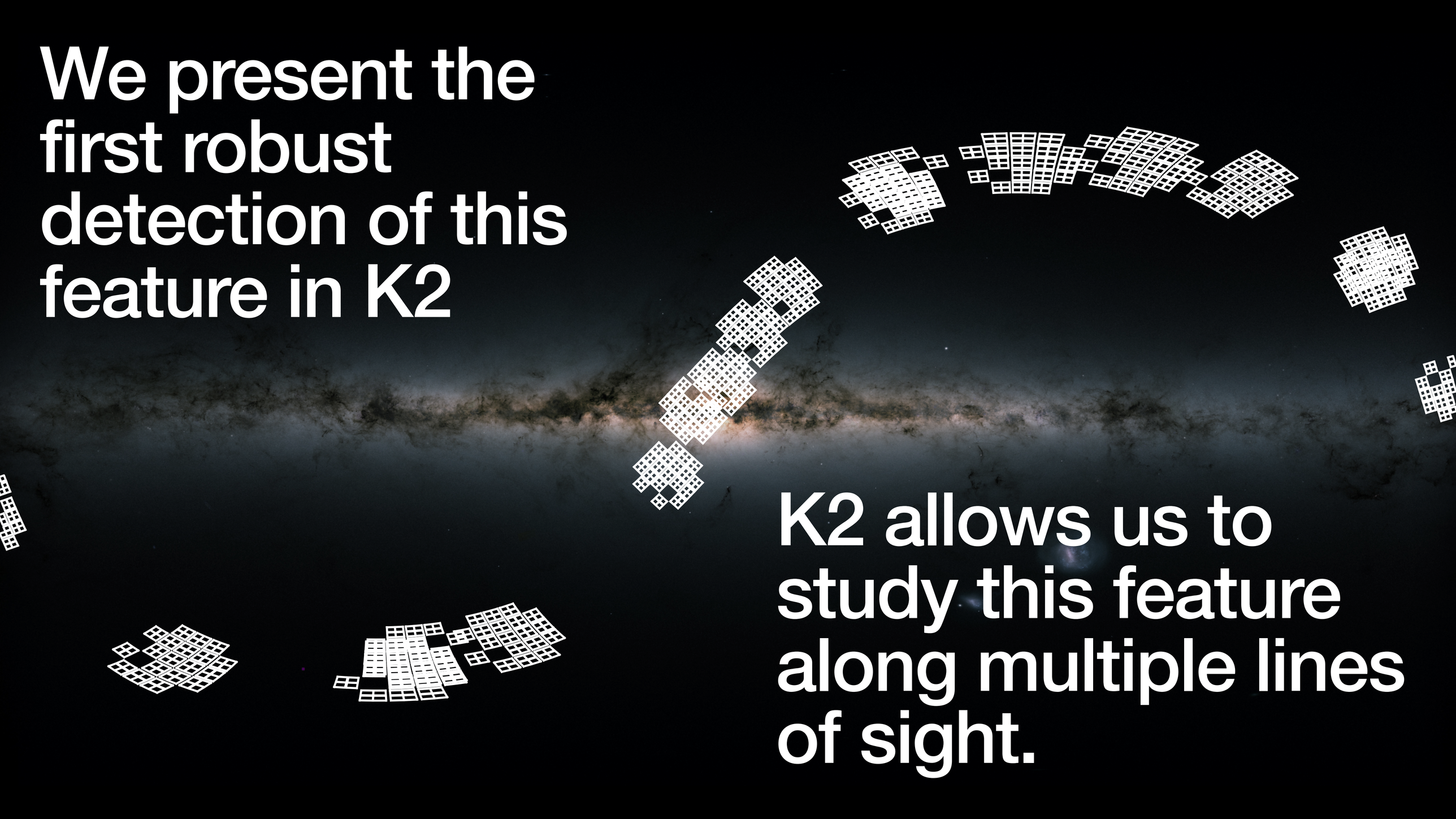
stellar rotation in K2

detection and properties of the rotation period gap

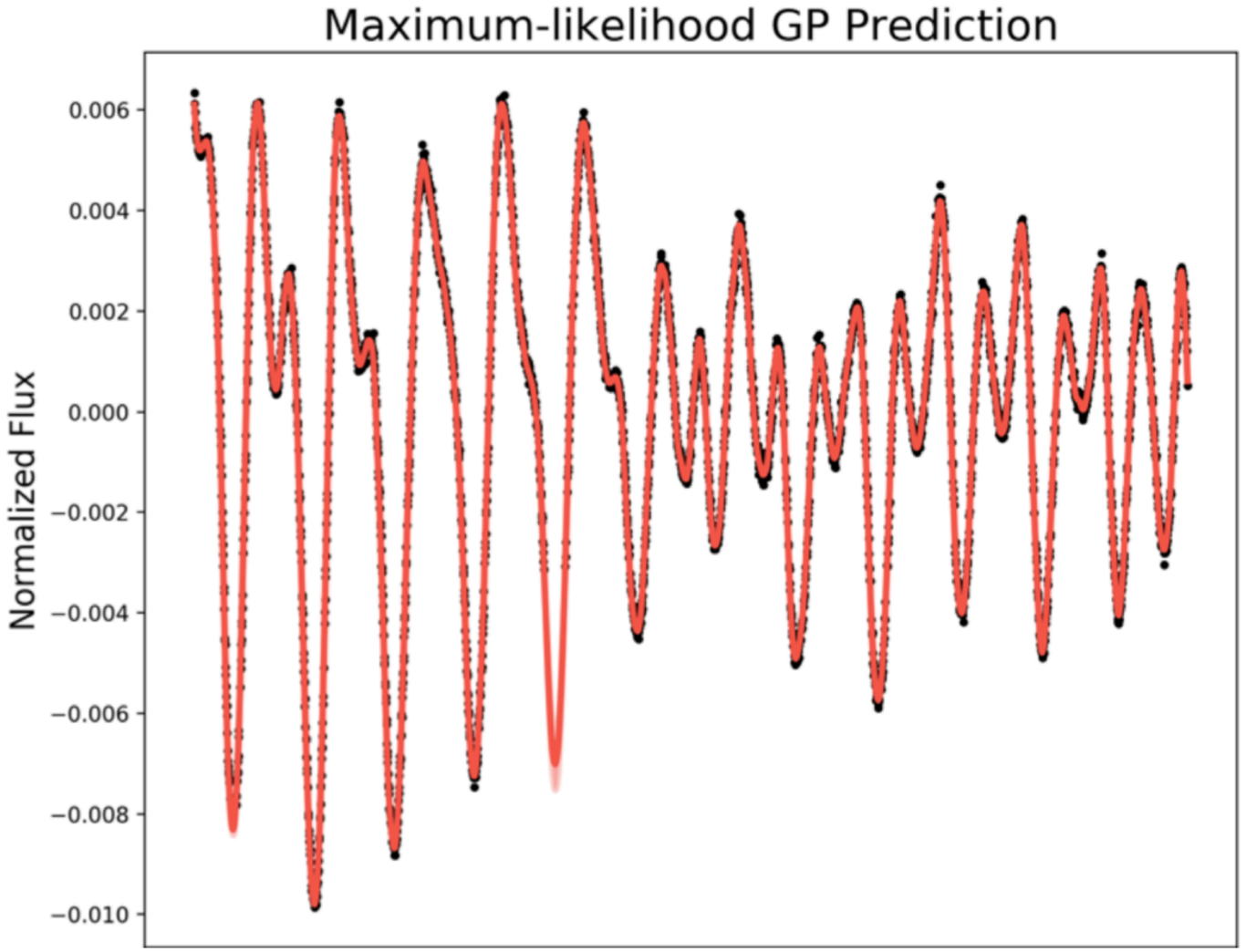


McQuillan et al., 2014

We present the first robust detection of this feature in K2



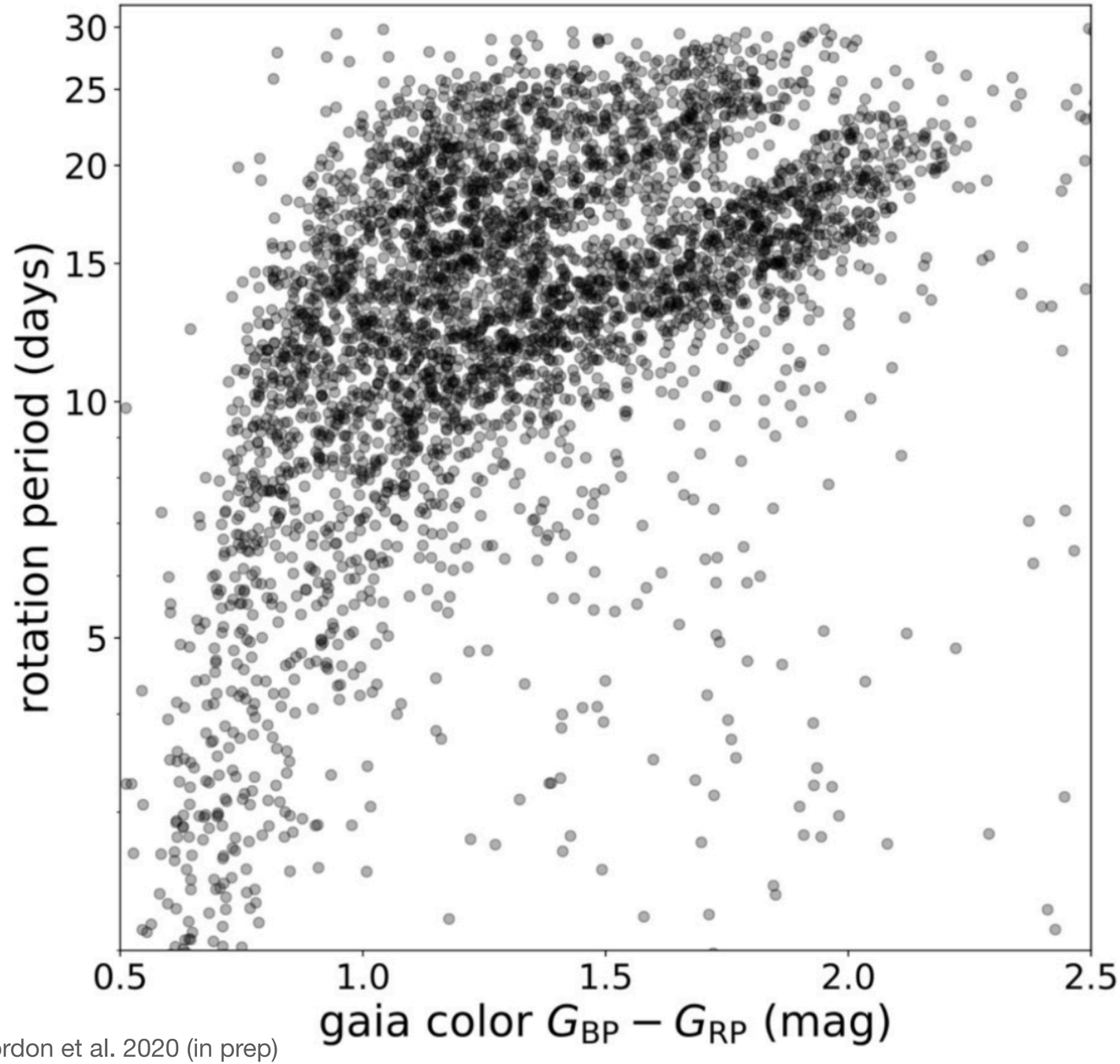
K2 allows us to study this feature along multiple lines of sight.



measuring periodicity

- Combined ACF + GP analysis
- For the GP we use the rotation kernel from exoplanet (Foreman-Mackey et al, 2018)
- Stars in our final sample are chosen on the basis of MCMC convergence diagnostics and agreement with ACF period detection.

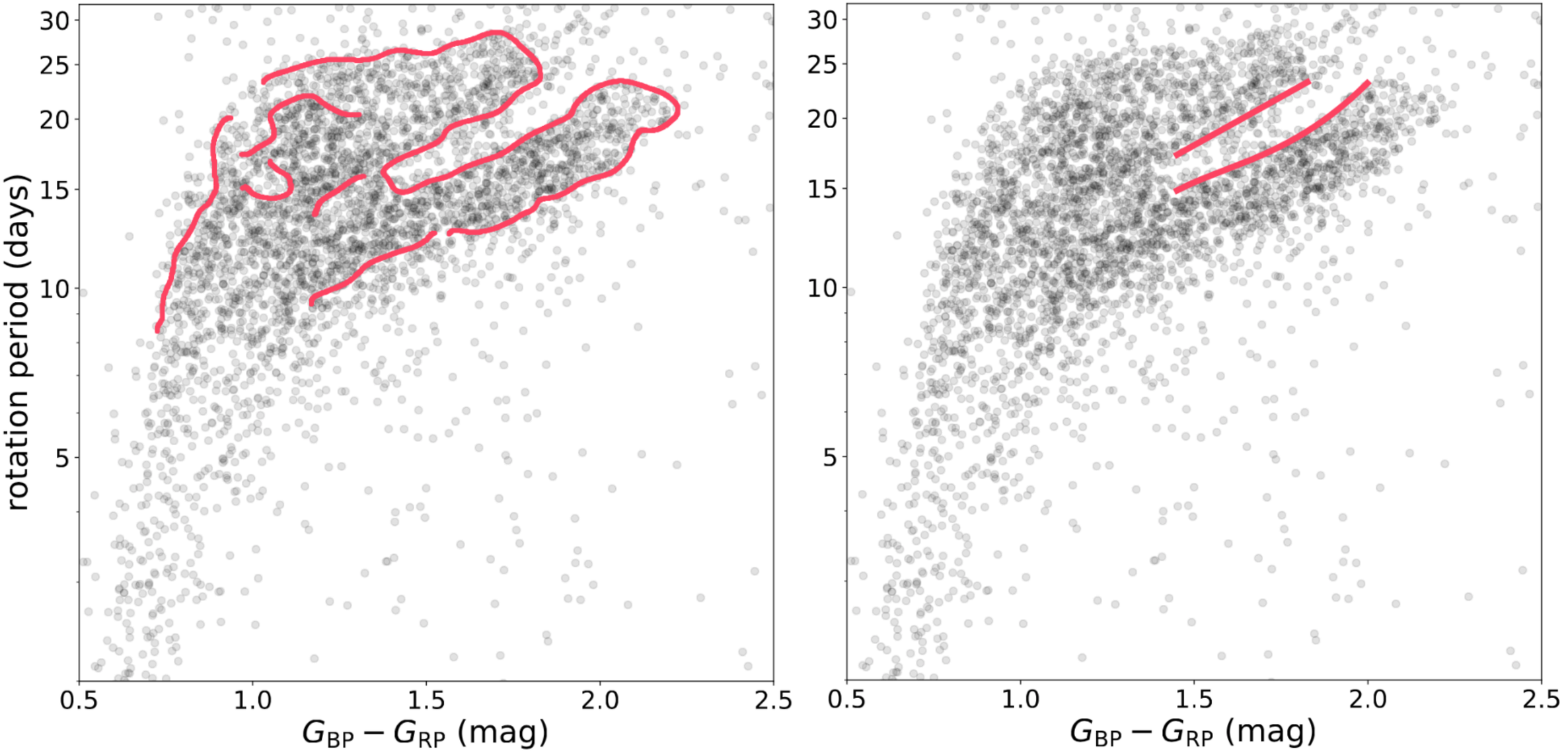
Gordon et al. 2020 (in prep)



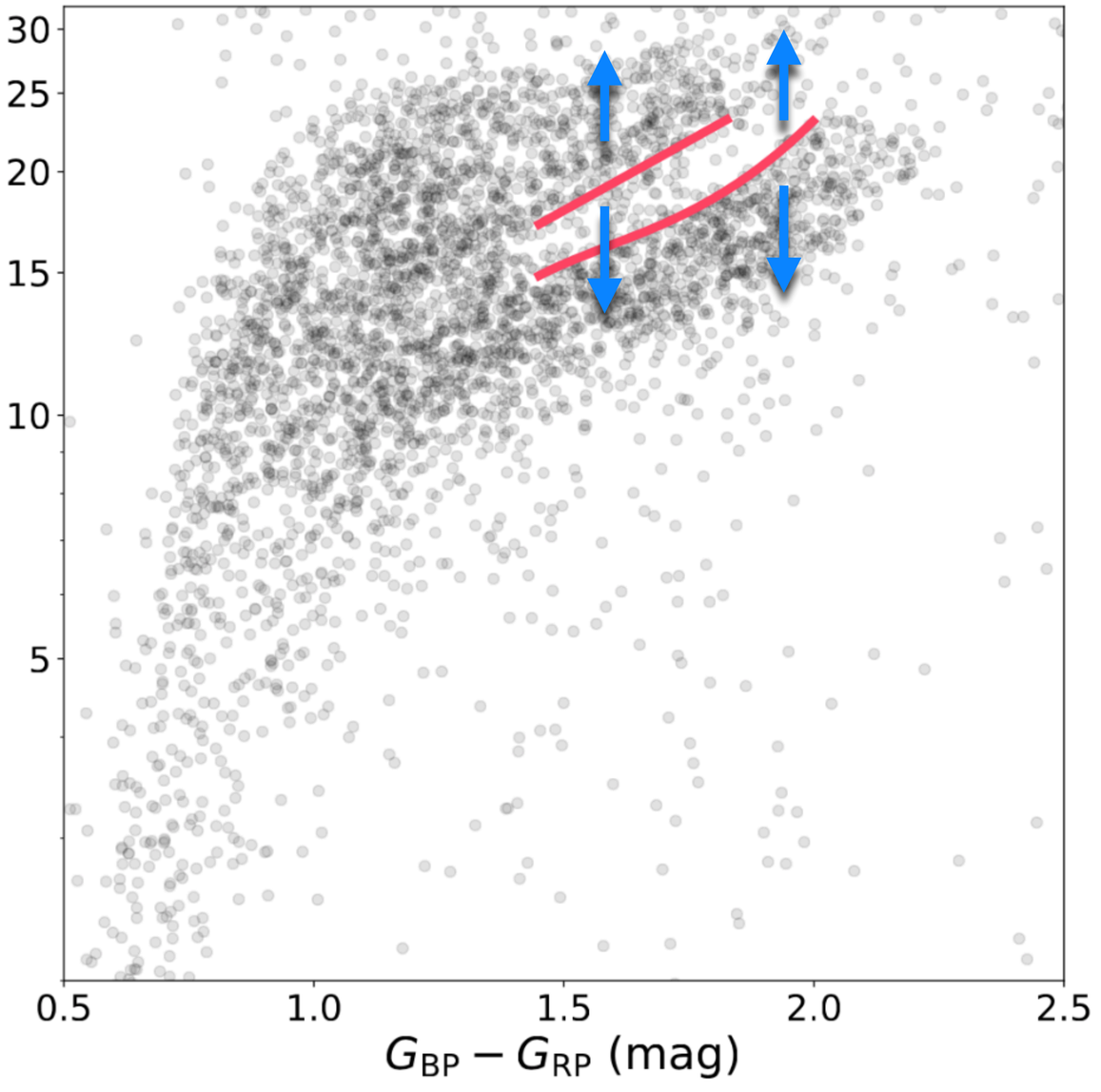
the final sample:

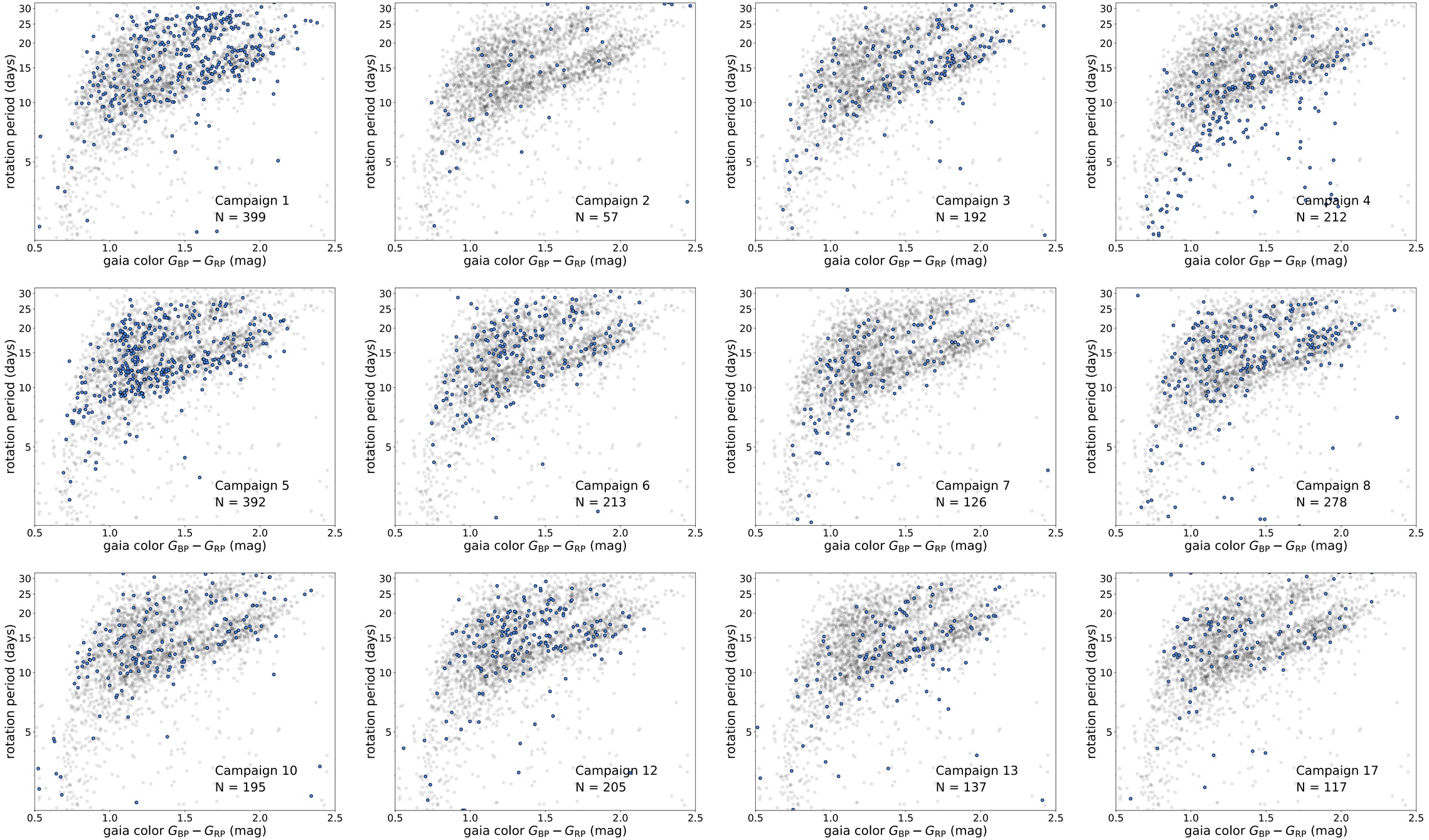
3,976 high-quality rotation periods with uncertainties

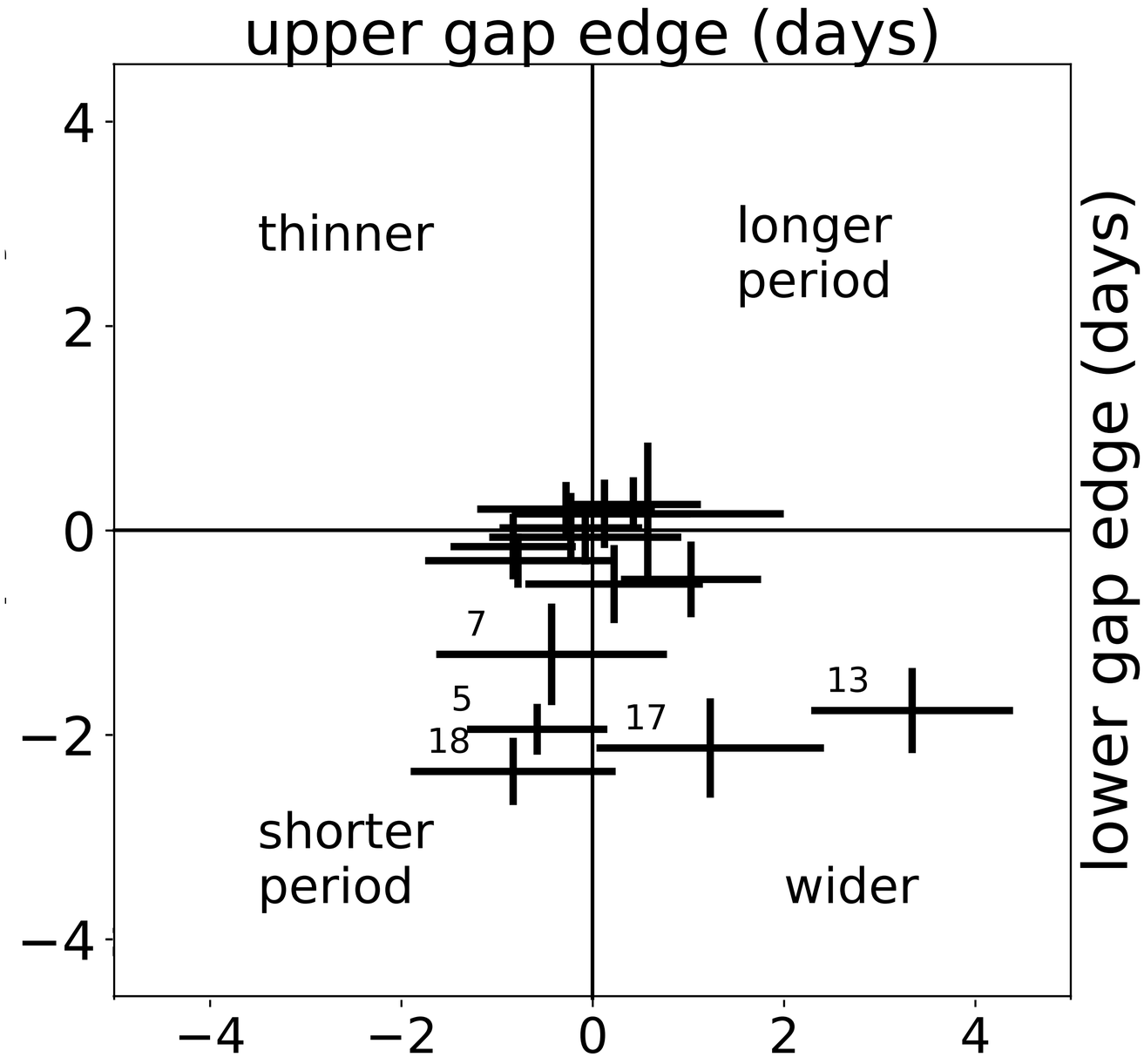
Gordon et al. 2020 (in prep)



Gordon et al. 2020 (in prep)


30
25
20
15
10
5
0.5
1.0
1.5
2.0
2.5
$G_{BP} - G_{RP}$ (mag)


rotation period (days)
gaia color $G_{BP} - G_{RP}$ (mag)
Campaign 1
N = 399
Campaign 2
N = 57
Campaign 3
N = 192
Campaign 4
N = 212
Campaign 5
N = 392
Campaign 6
N = 213
Campaign 7
N = 126
Campaign 8
N = 278
Campaign 10
N = 195
Campaign 12
N = 205
Campaign 13
N = 137
Campaign 17
N = 117



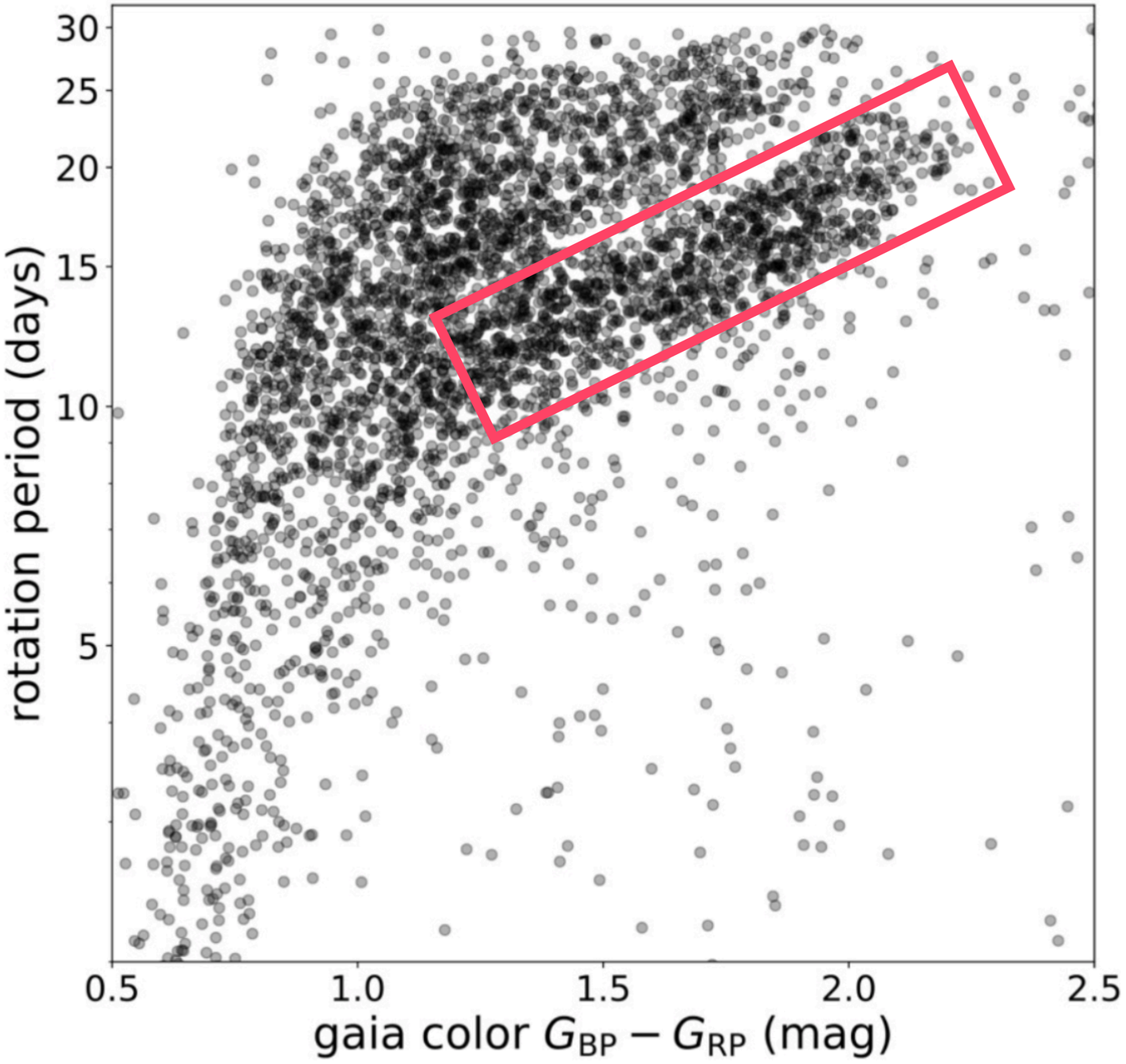
Gordon et al. 2020 (in prep)

recent star formation

McQuillan et al., 2014, Davenport & Covey, 2018

spindown physics

McQuillan et al., 2013, 2014, Angus et al., 2020, Spada & Lanzafame, 2020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rotation period (days)
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1.0
1.5
2.0
2.5
gaia color $G_{BP} - G_{RP}$ (mag)

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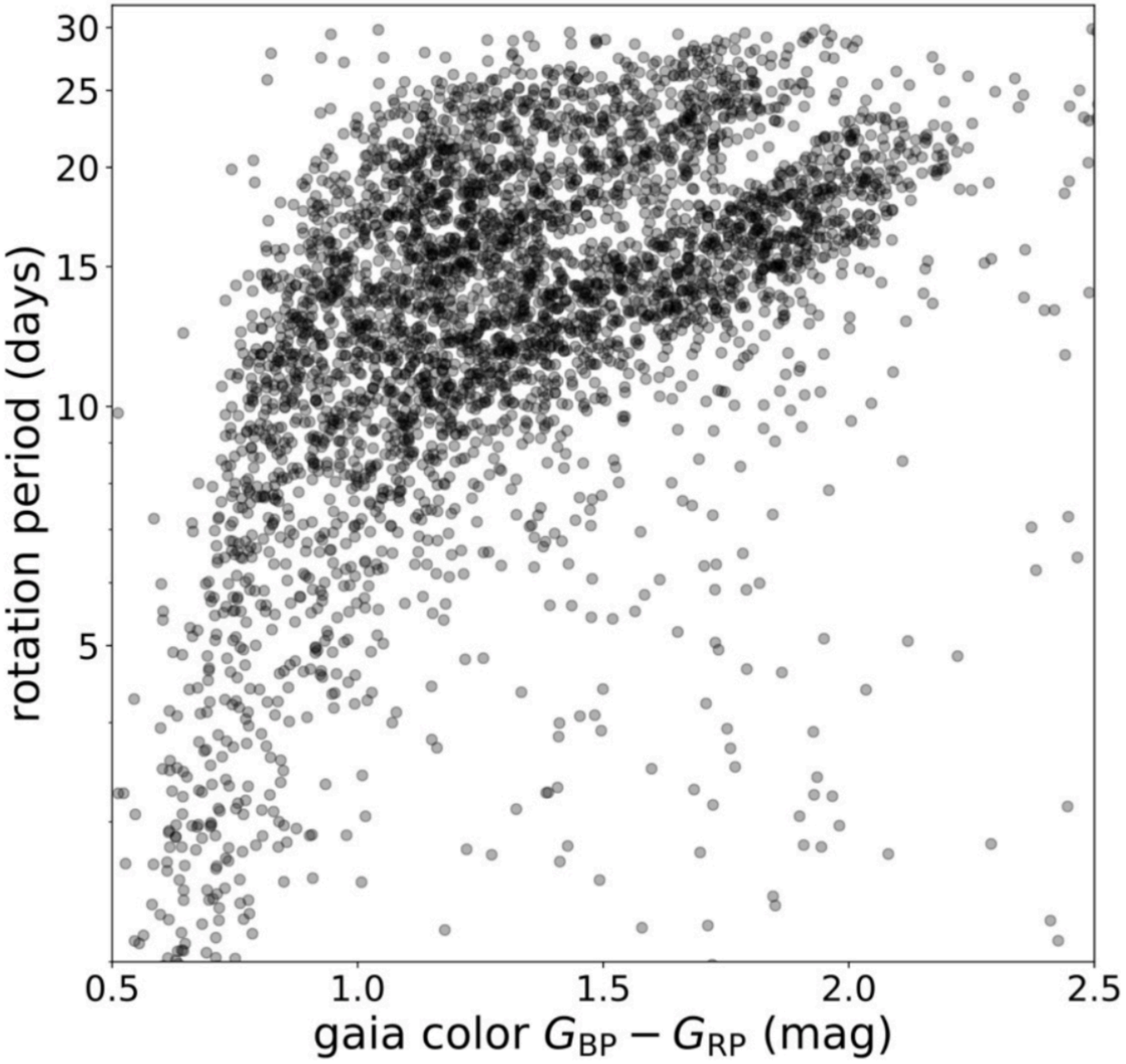
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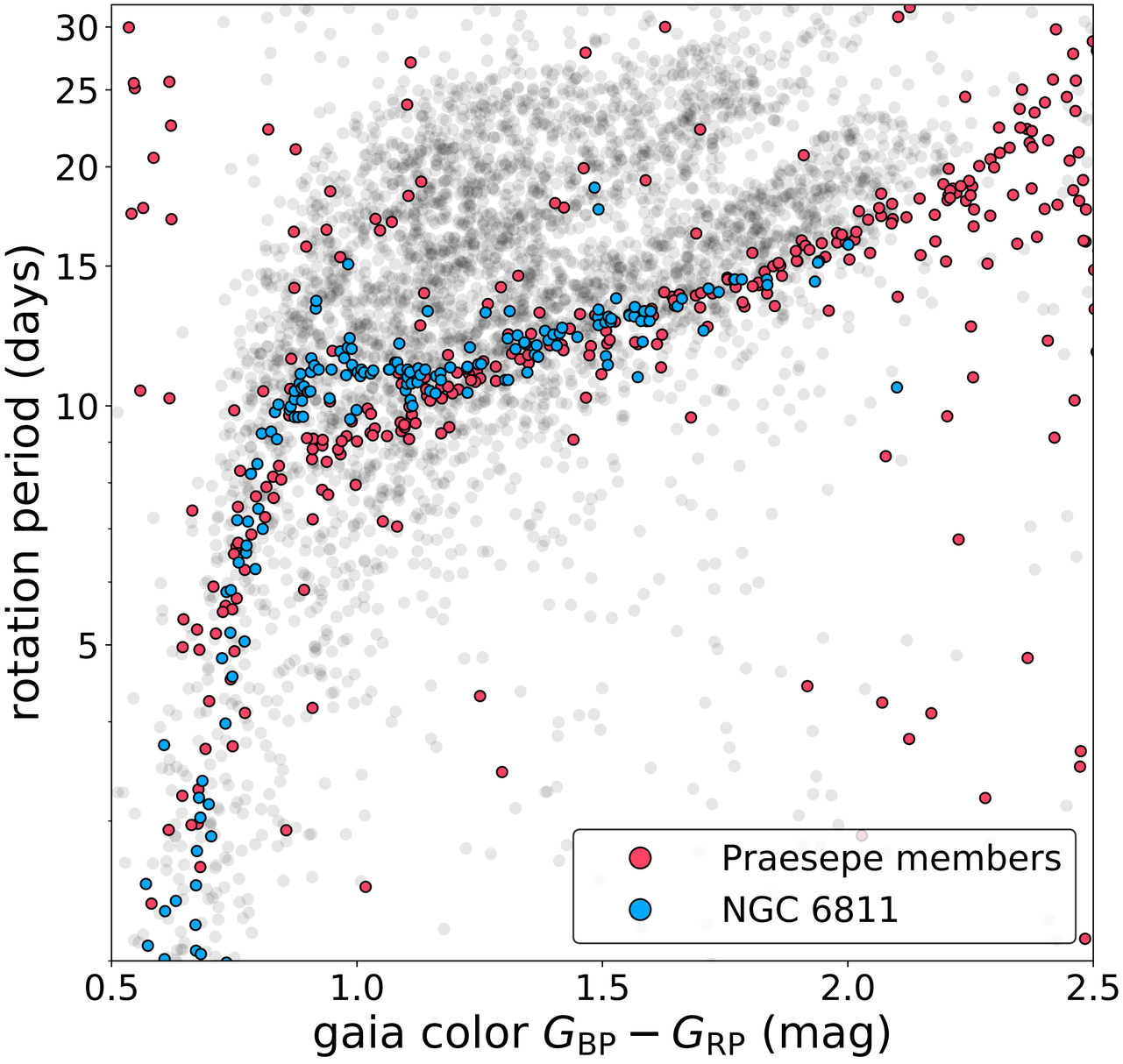


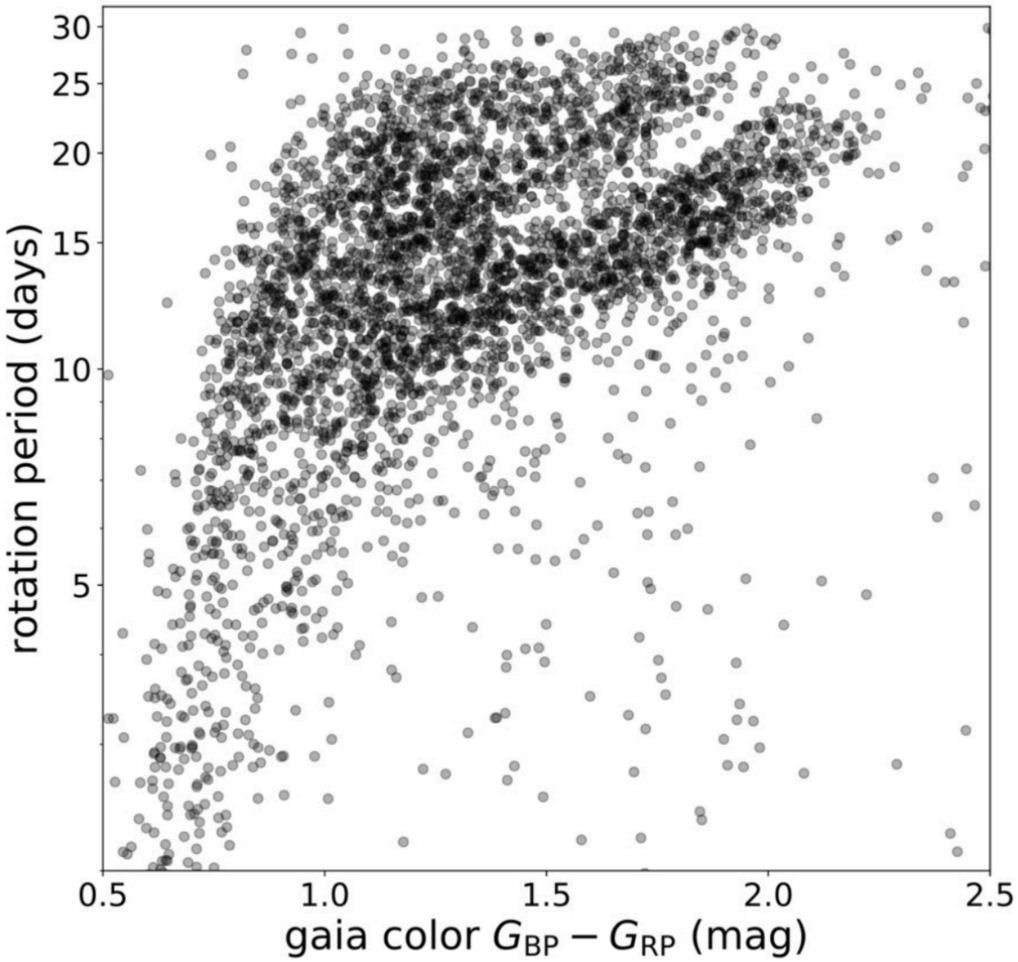
Stalled spin down model

McQuillan et al., 2013, 2014, Angus et al., 2020, Spada & Lanzafame, 2020

- NGC 6811 (1,000 Myr)
- Praesepe (670 Myr)

Praesepe membership from Cantat-Gaudin et al., 2018

NGC 6811 periods from Curtis et al., 2019



Conclusions

- We have detected the rotation period gap in K2.
  - Appears independent of direction
- We need additional observations in order to understand this feature.
  - Rotation periods for clusters near or crossing the gap
  - Theoretical understandings of non-Skumanich spin down
  - Independent age measurements for field stars (Gaia kinematics?)