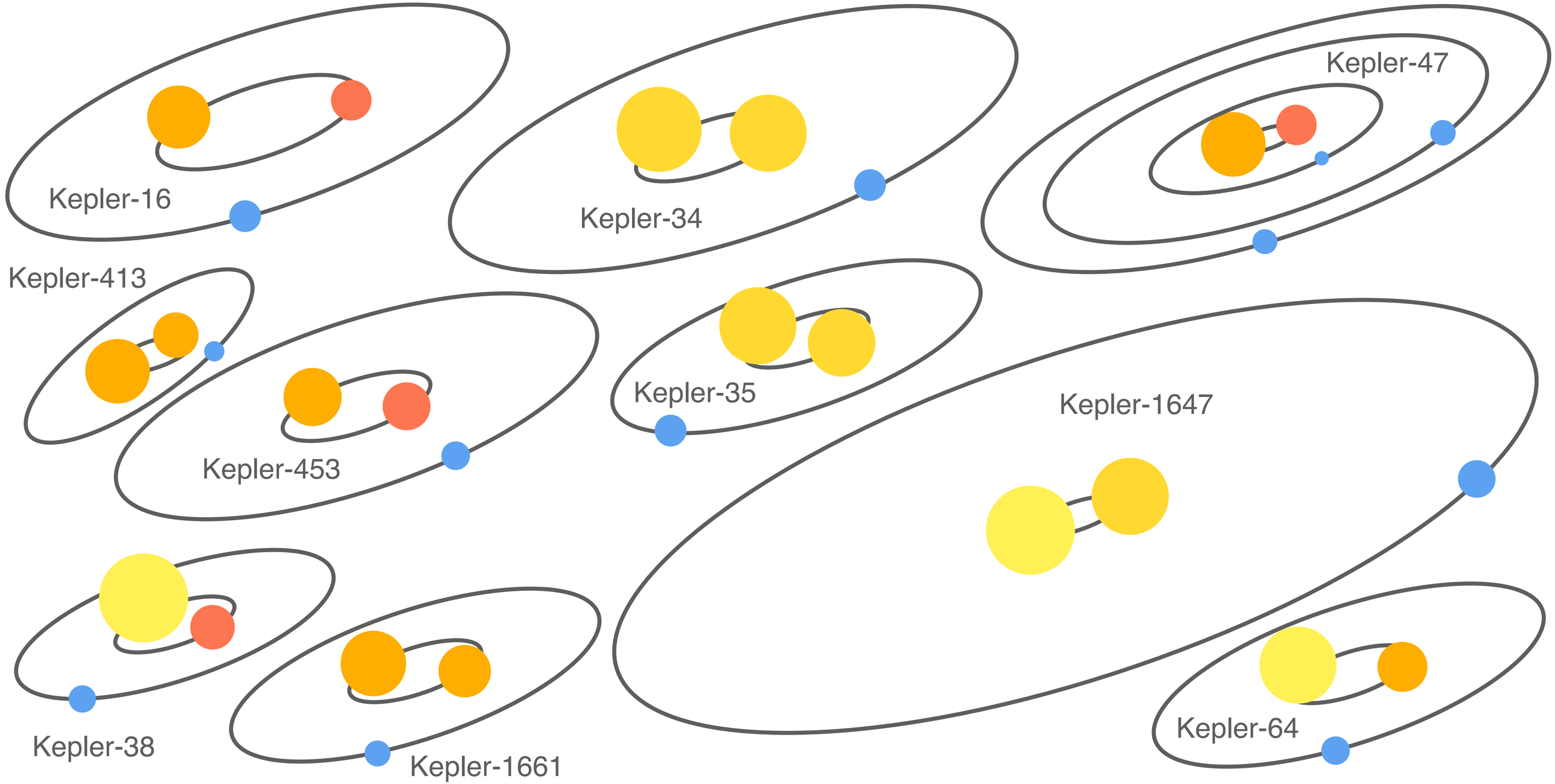
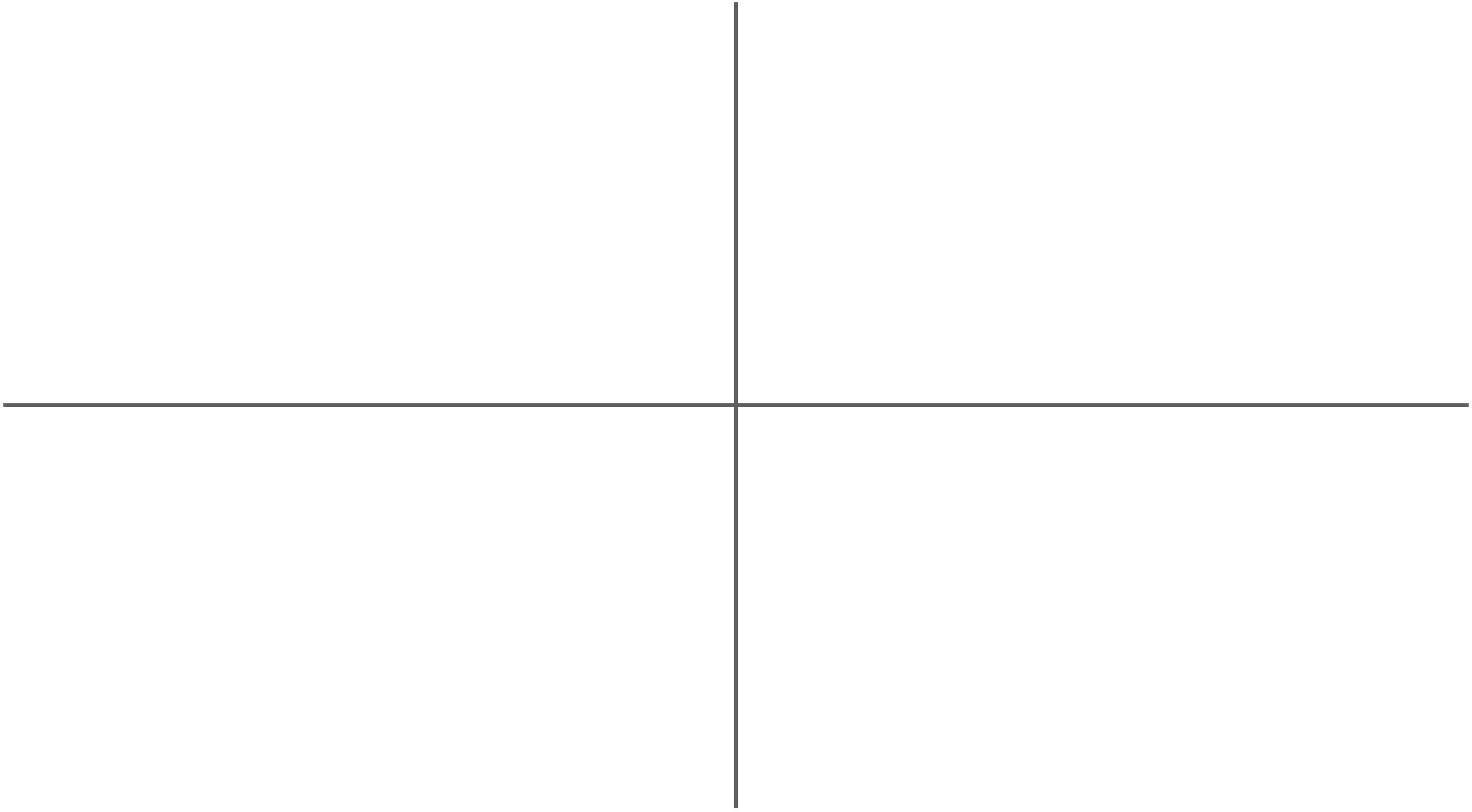
The known (and unknown) population of CBPs

David Martin

Tufts UNIVERSITY

The known (and unknown) population of CBPs





How big are the planets?

How big are the planets?

How big are the orbits?

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How big are the orbits?

How are the orbits oriented?

How big are the planets?

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What are the binaries like?

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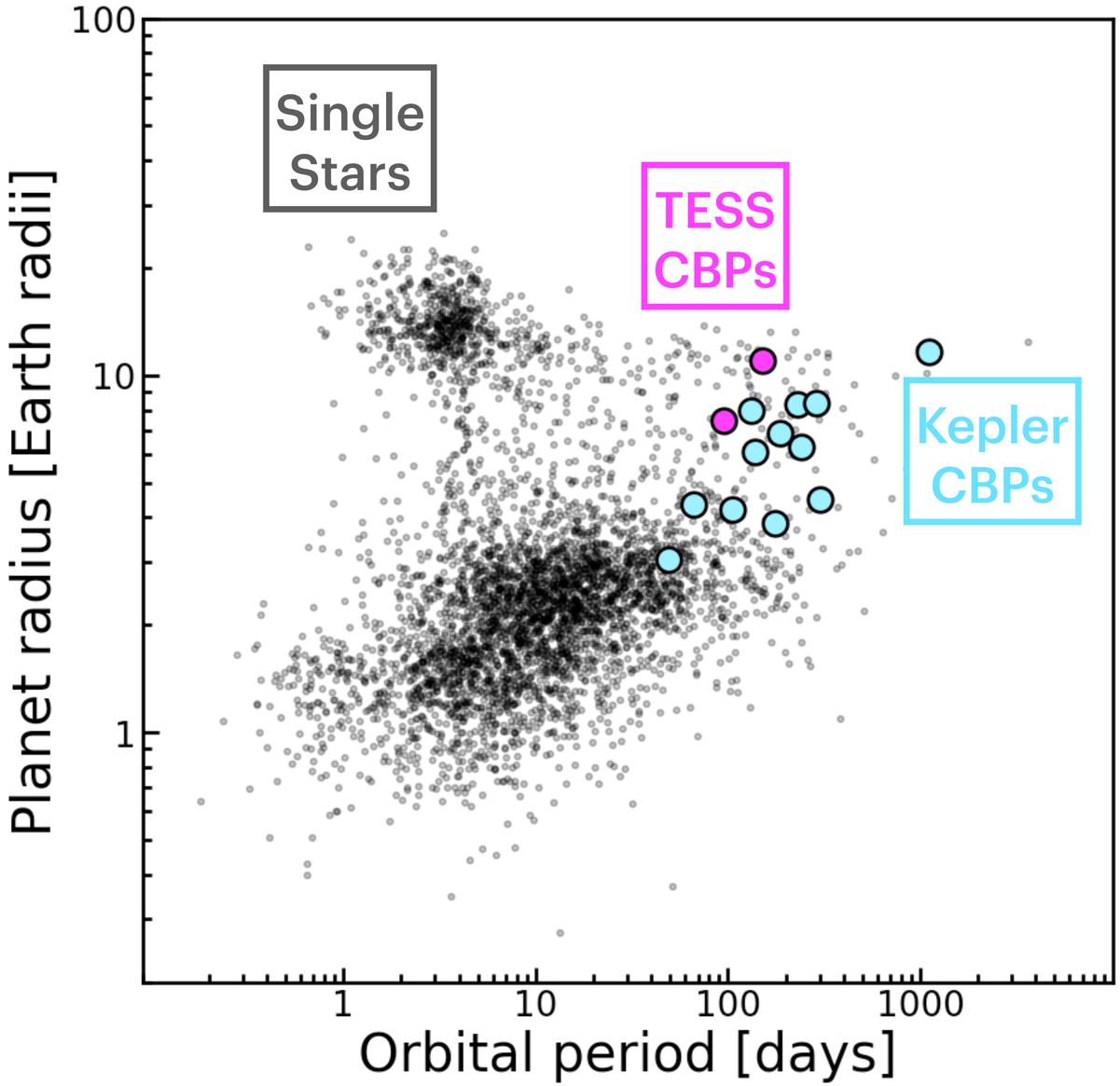
How big are the planets?



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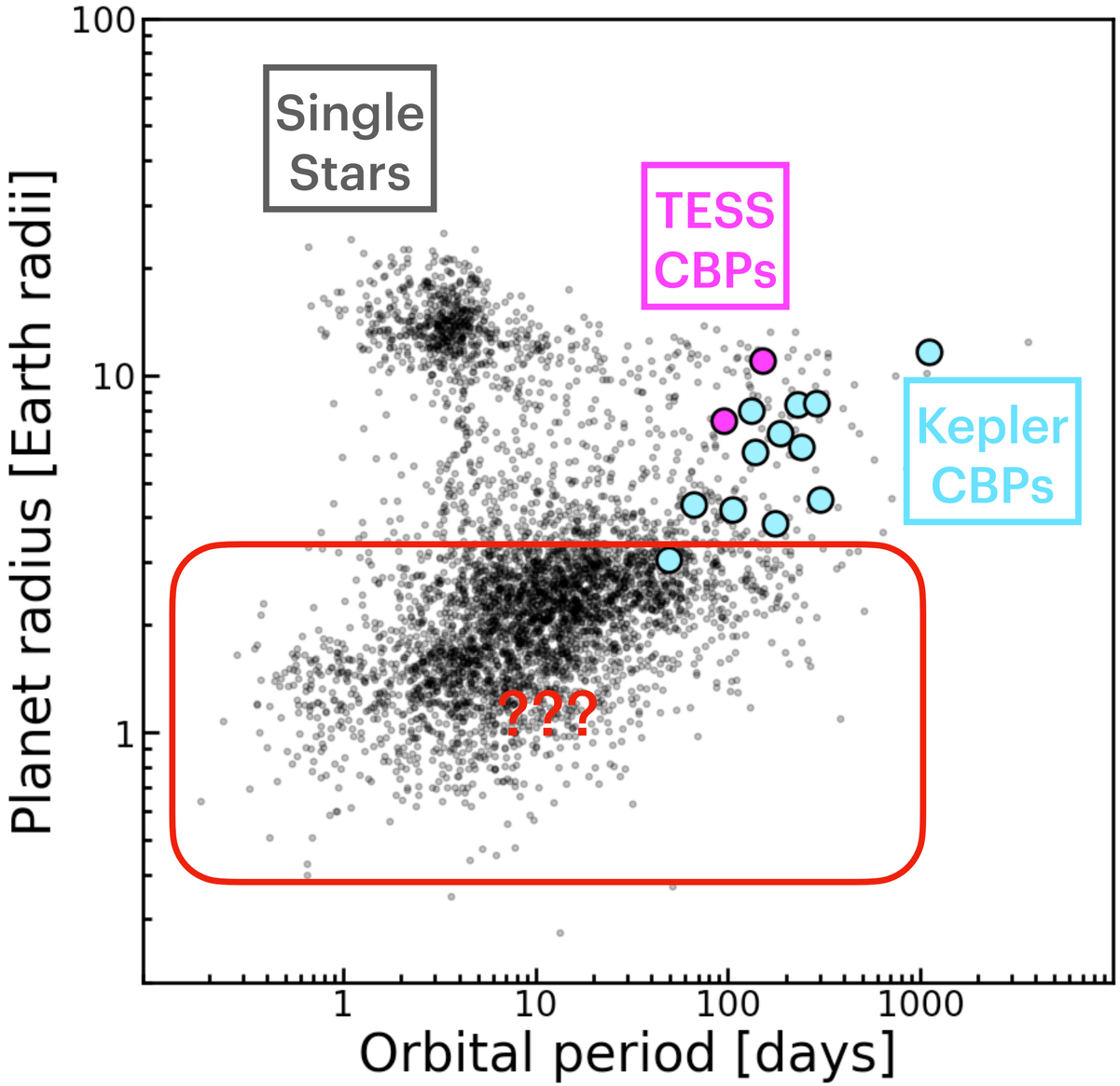
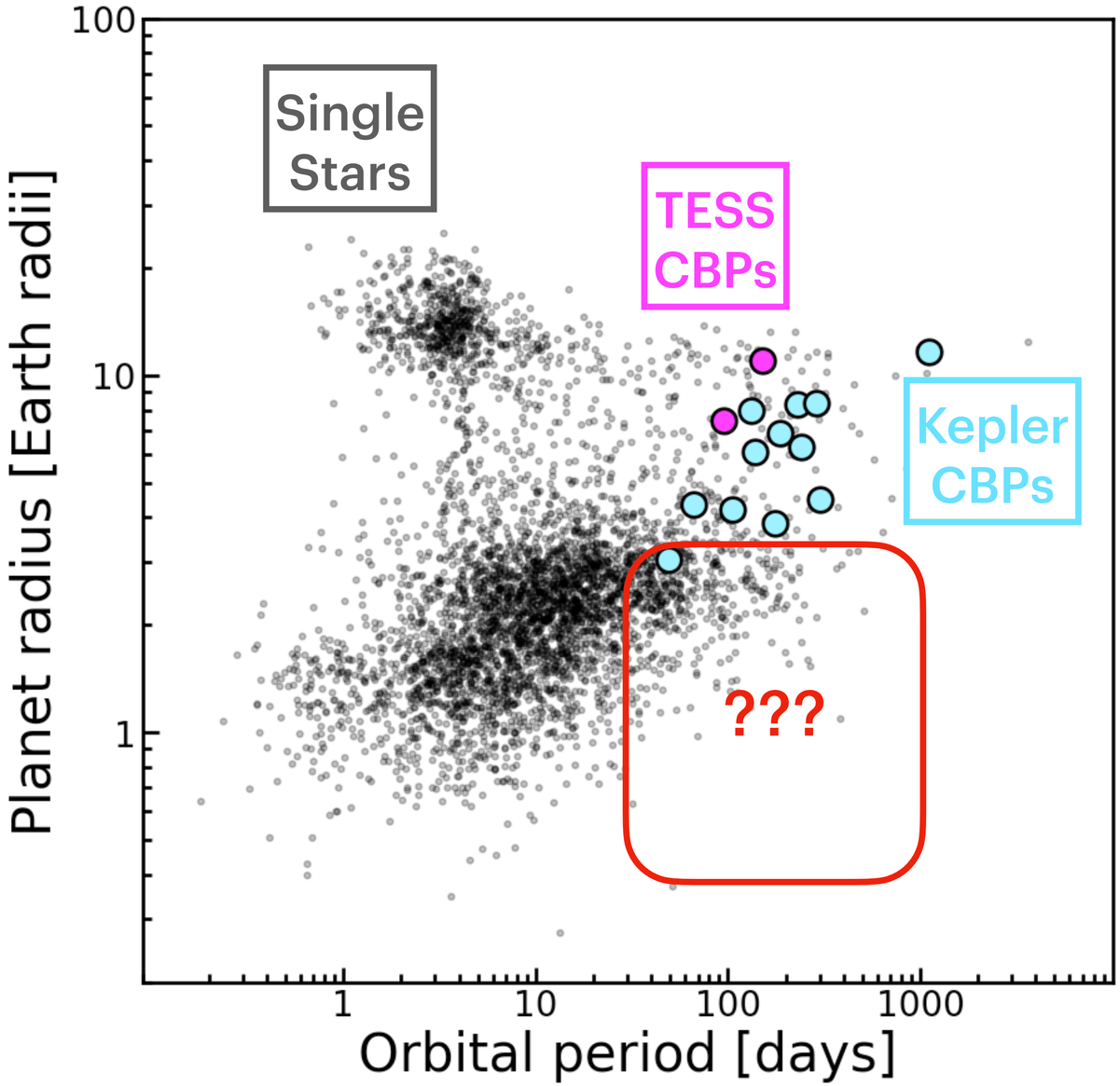


Where are the small CBPs?



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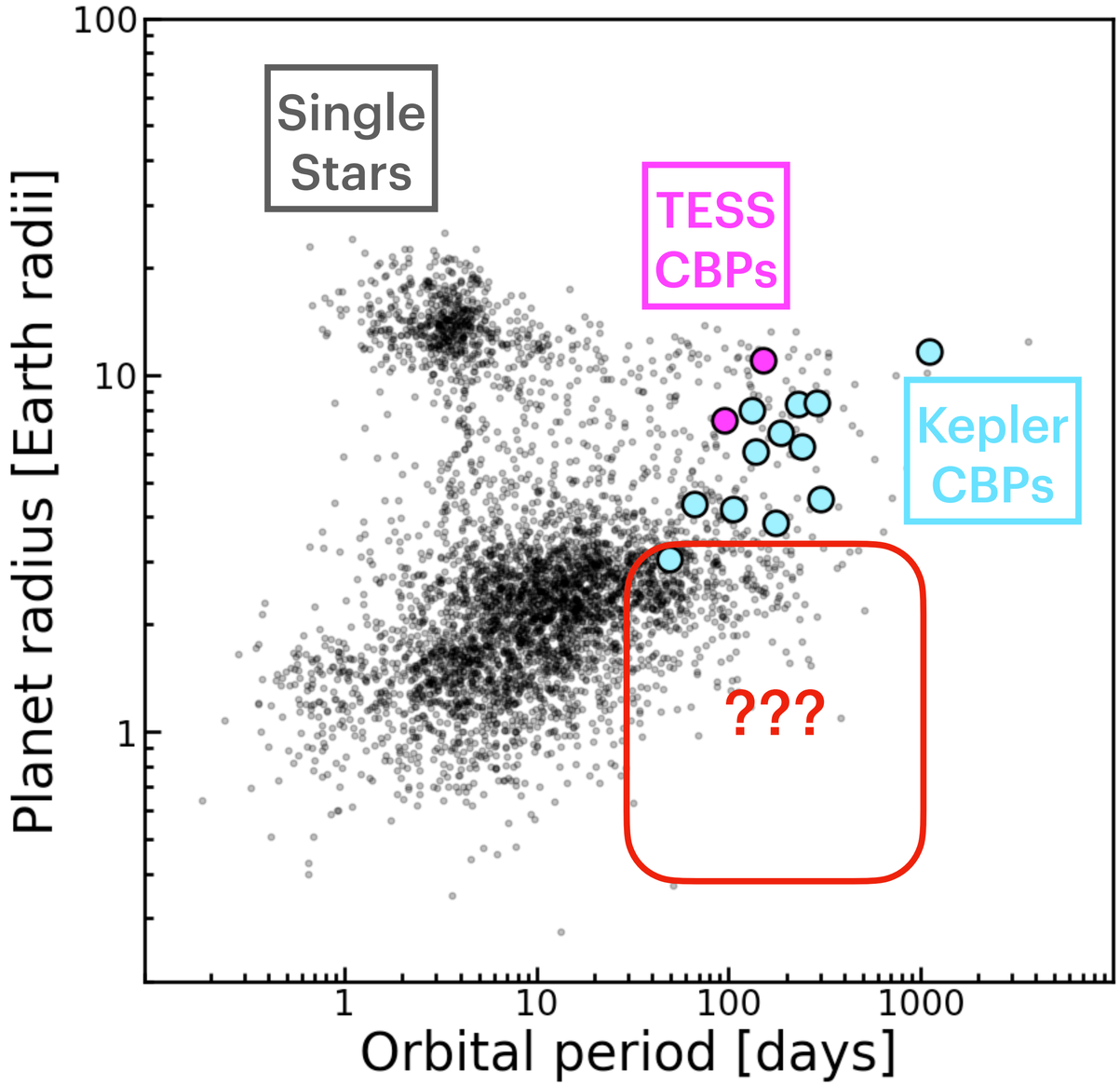
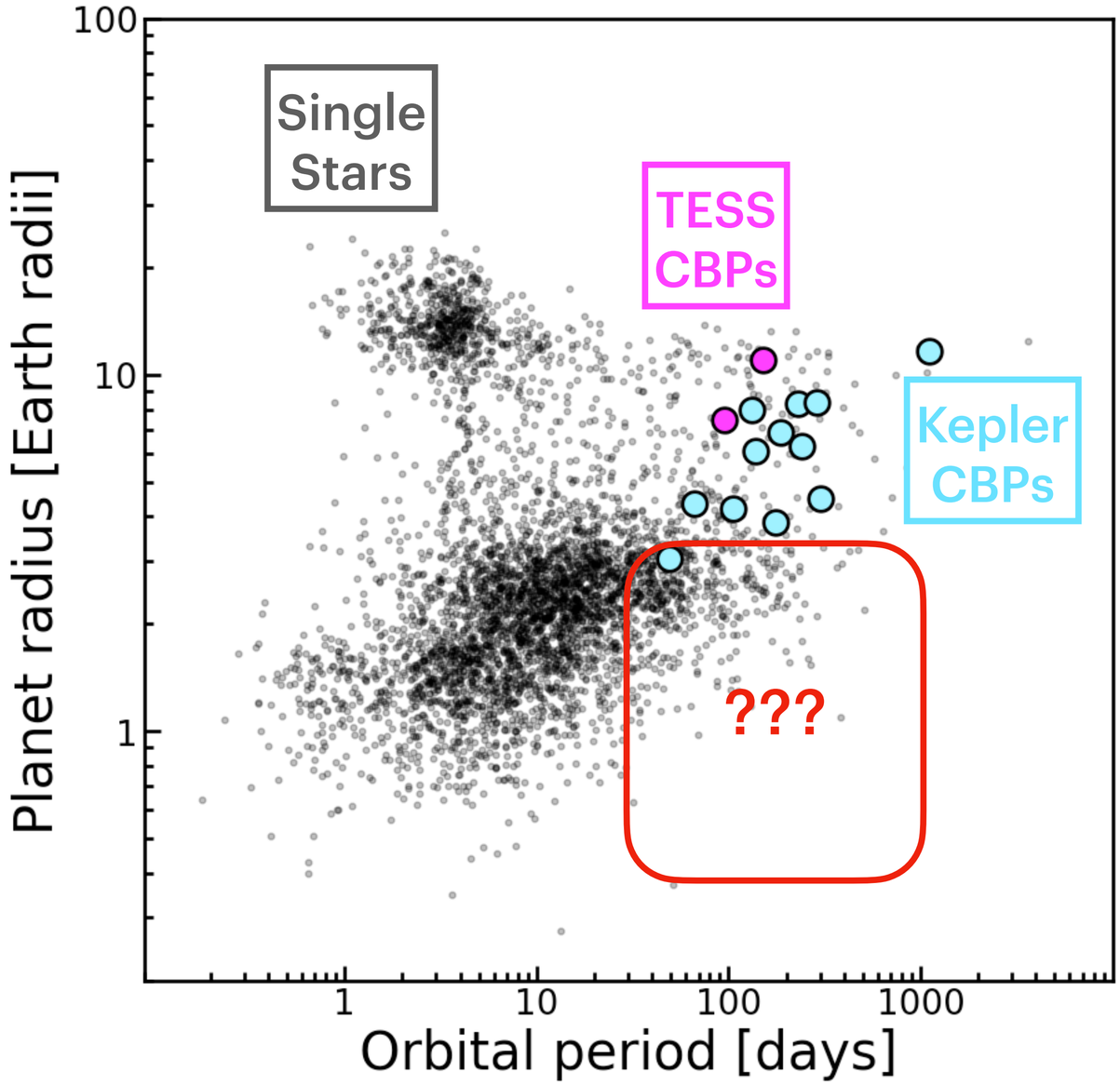


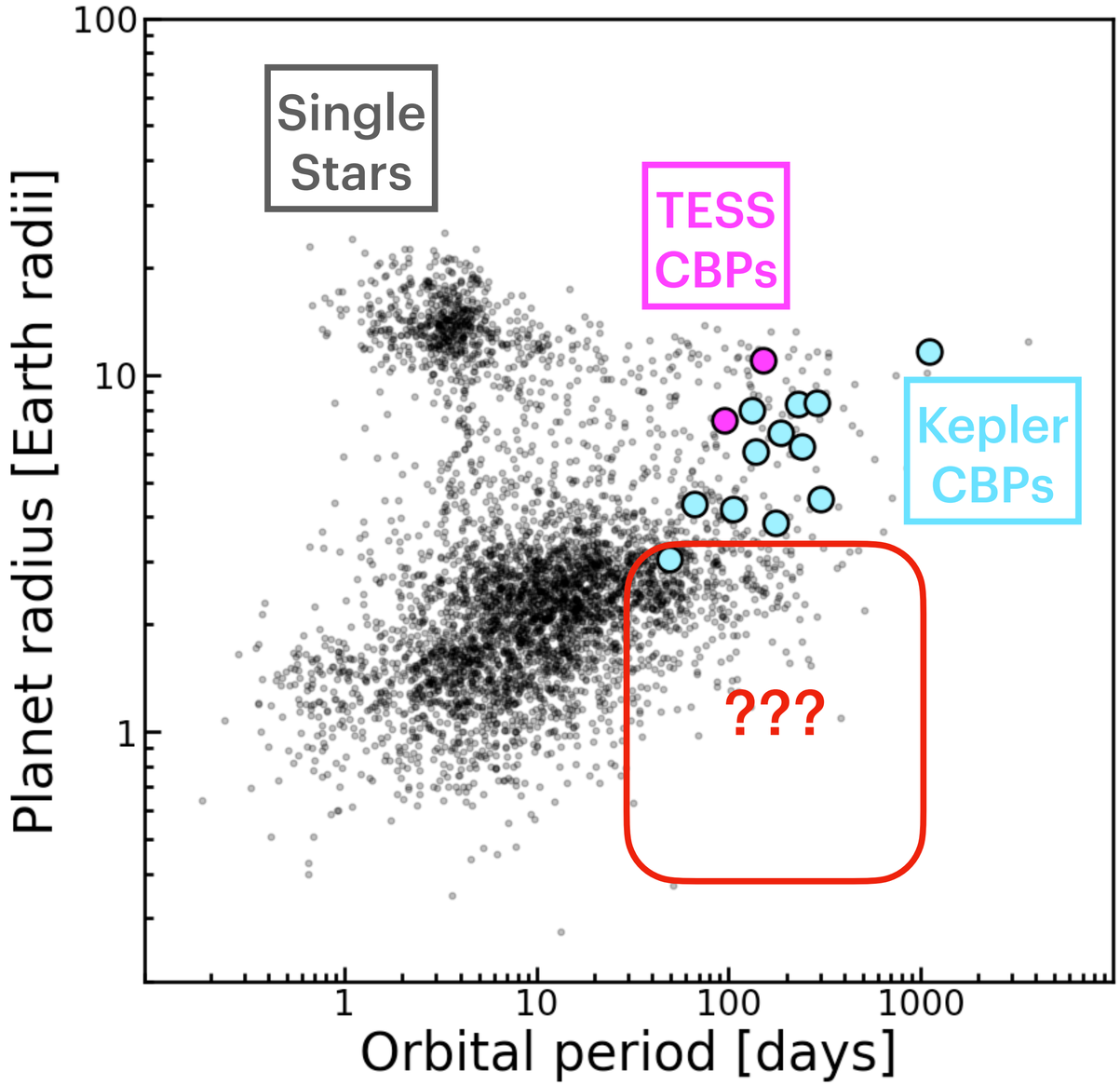
1. Too hard to find transiting

Where are the small CBPs?



1. Too hard to find transiting
2. Small CBPs cannot form

Where are the small CBPs?



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2. Small CBPs cannot form
3. Small CBPs cannot survive

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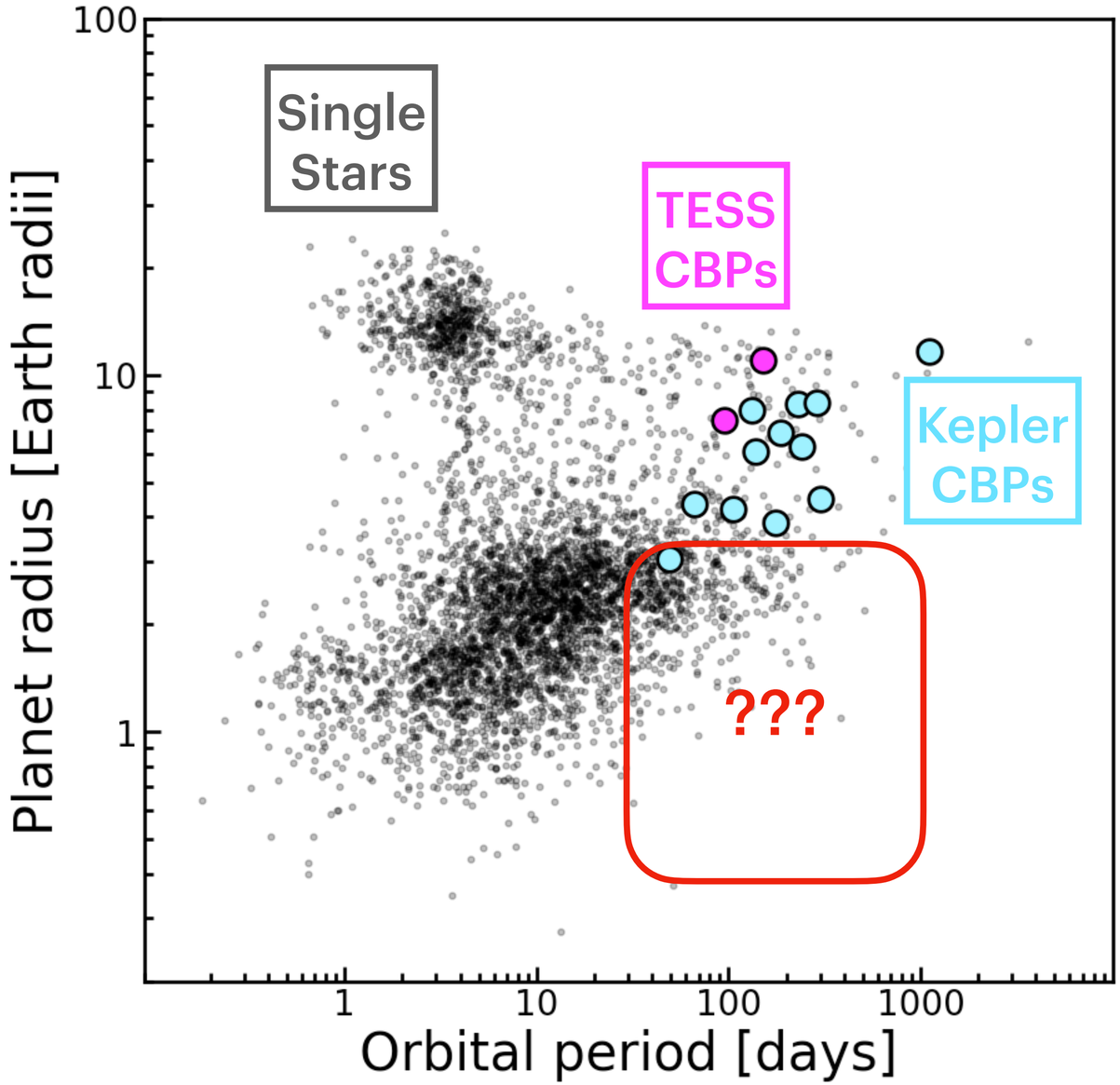

1. Too hard to find transiting
2. Small CBPs cannot form
3. Small CBPs cannot survive
4. Small CBPs are misaligned

How big are the planets?

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Where are the small CBPs?

How big are the orbits?

How are the orbits oriented?

What are the binaries like?

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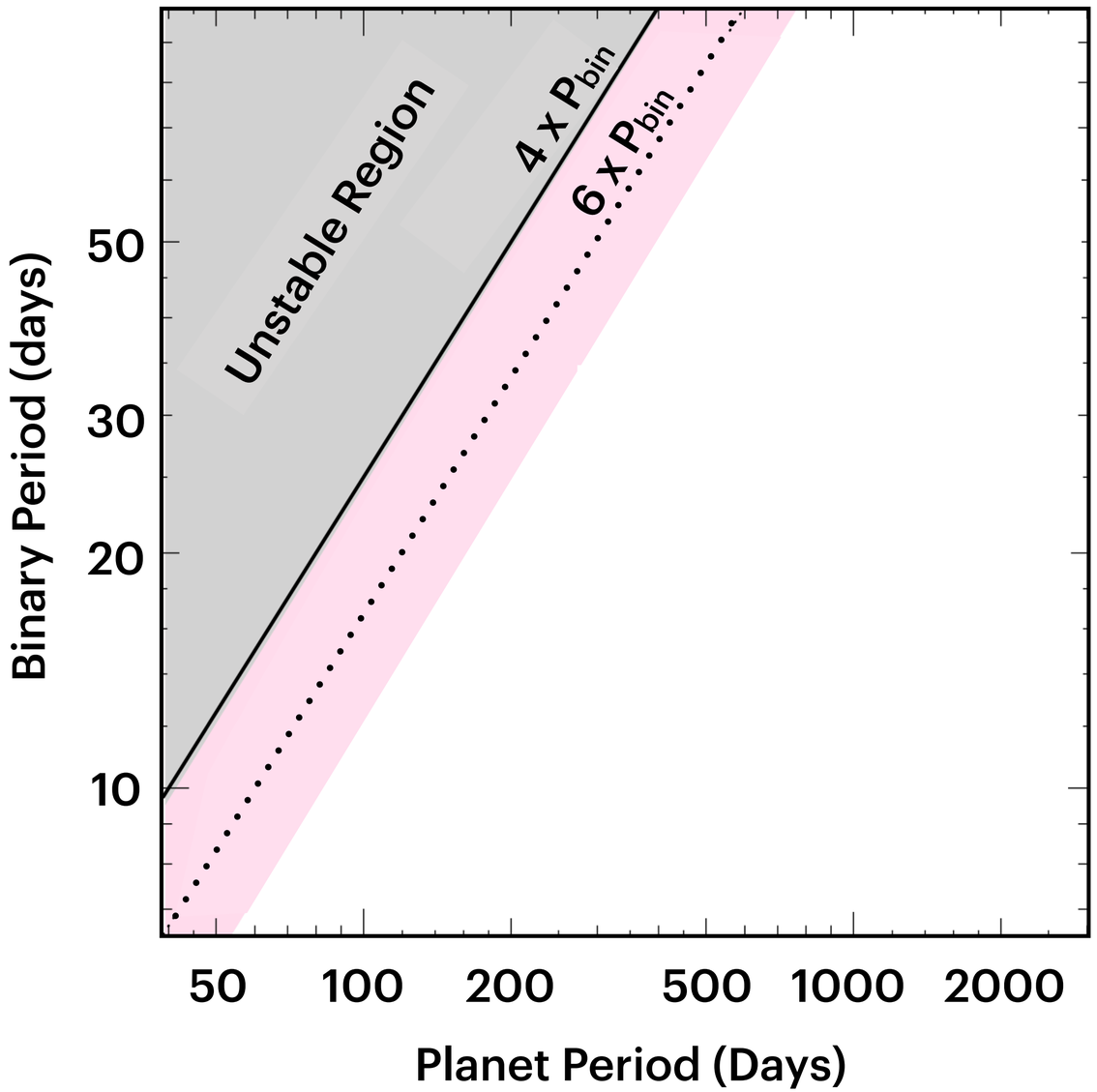

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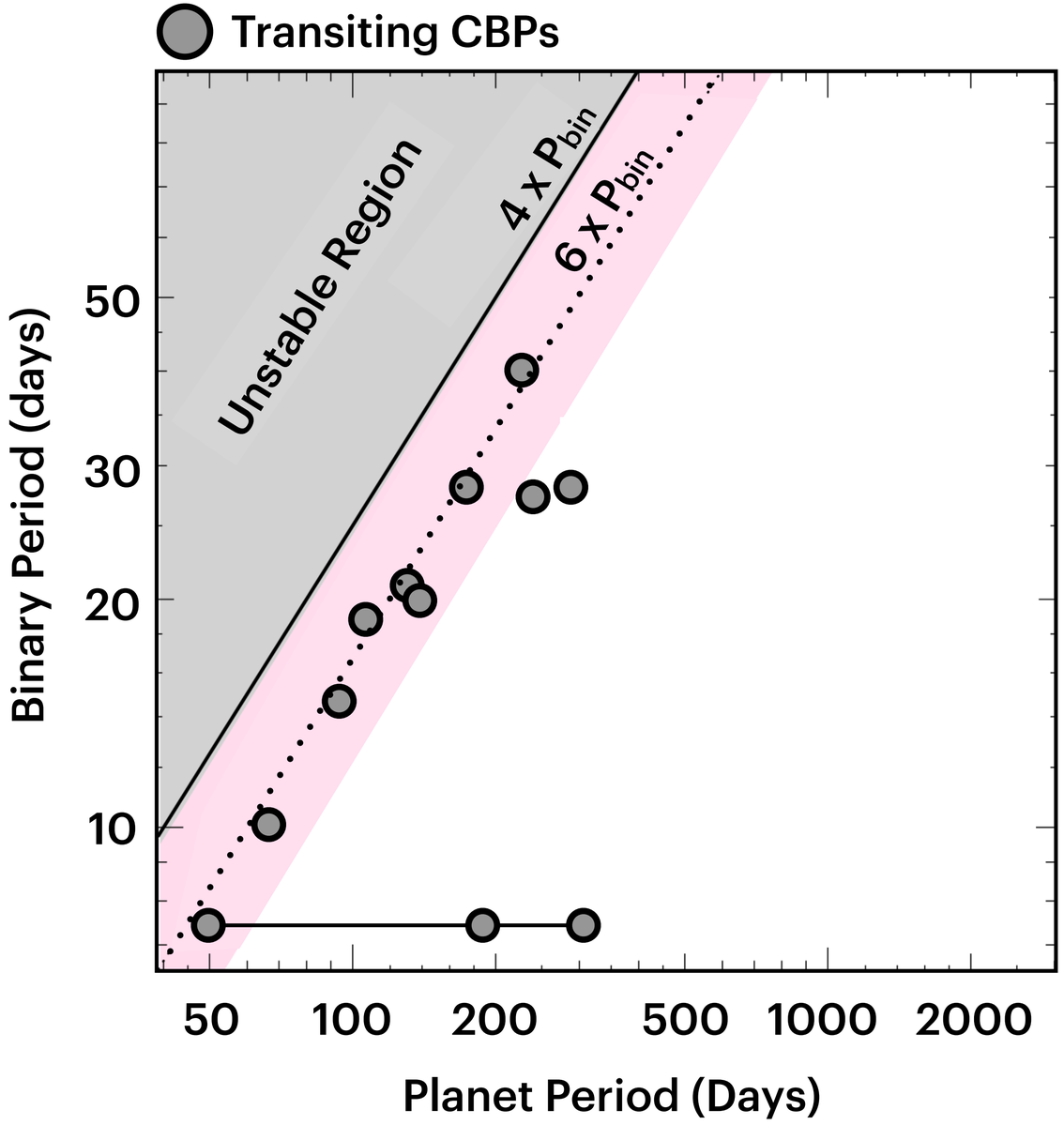

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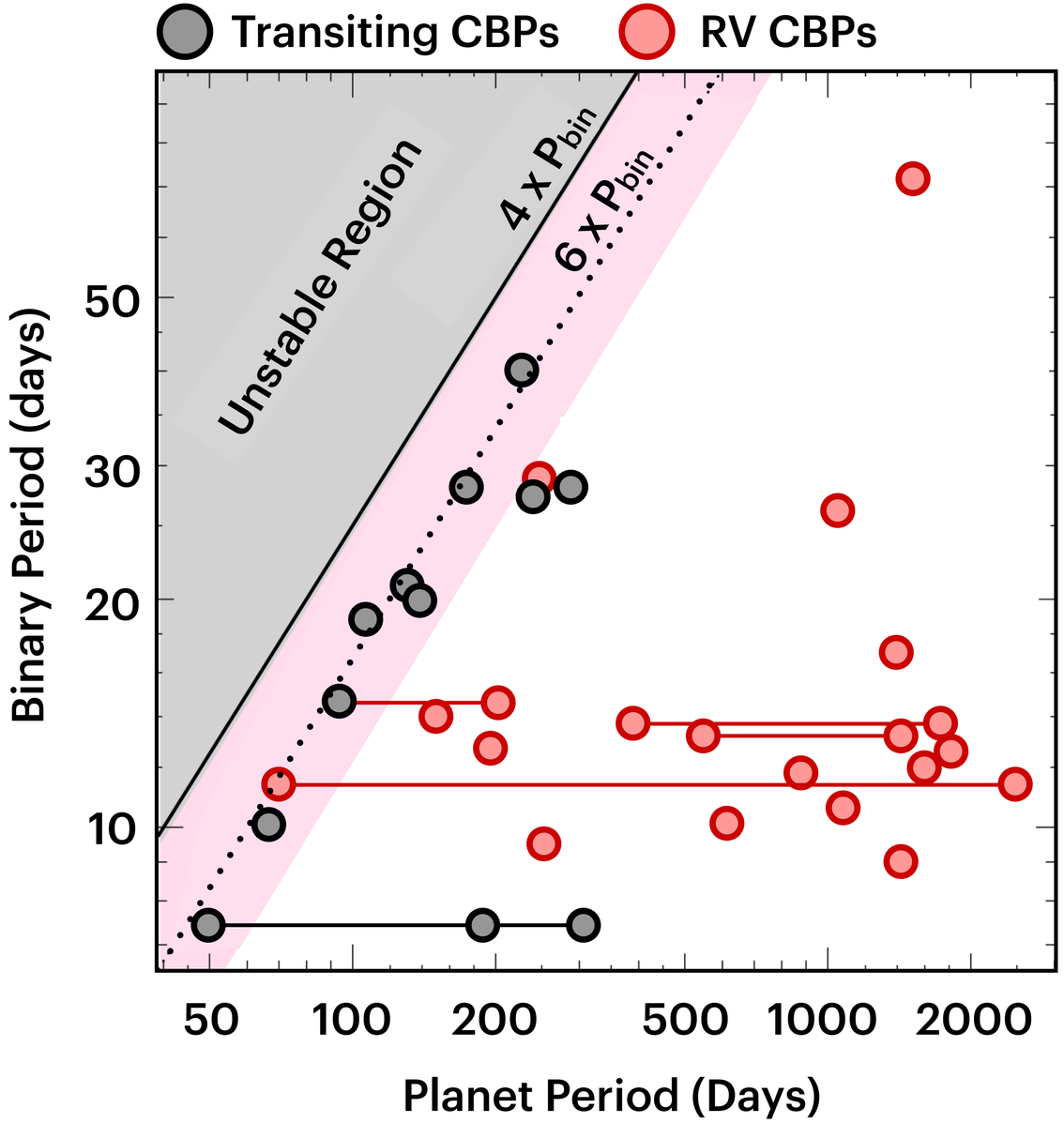

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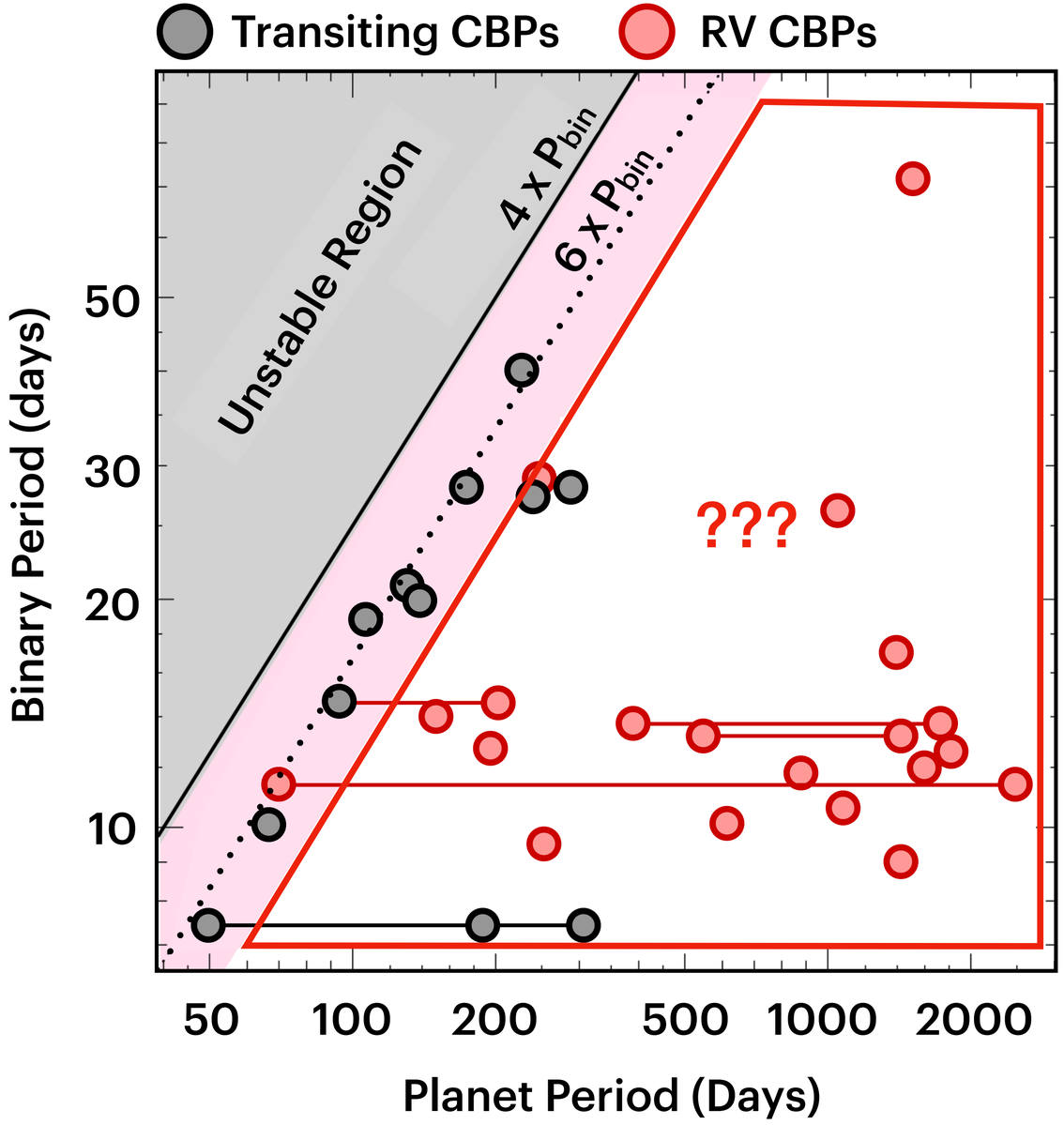
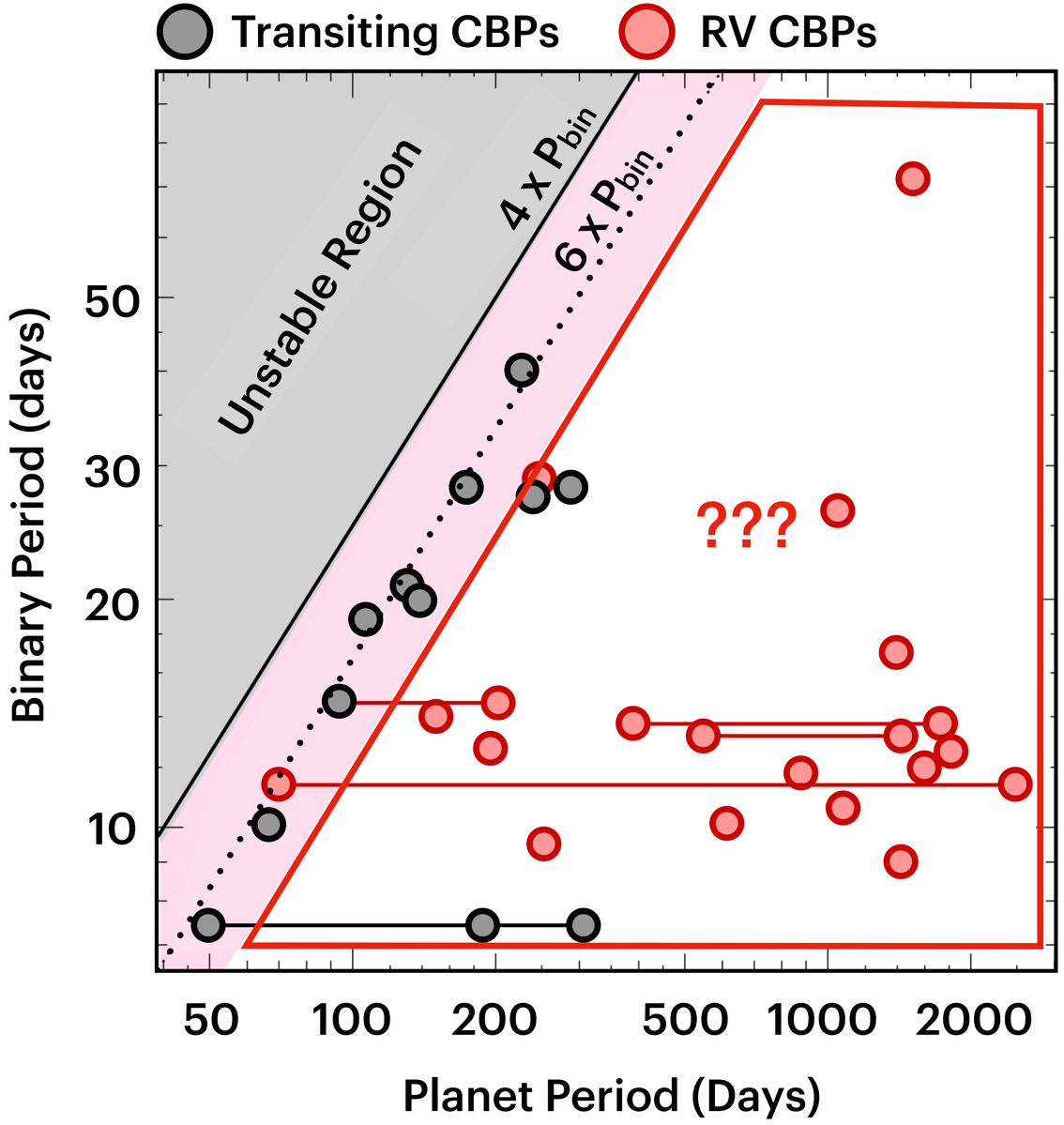


Is there a pile-up?



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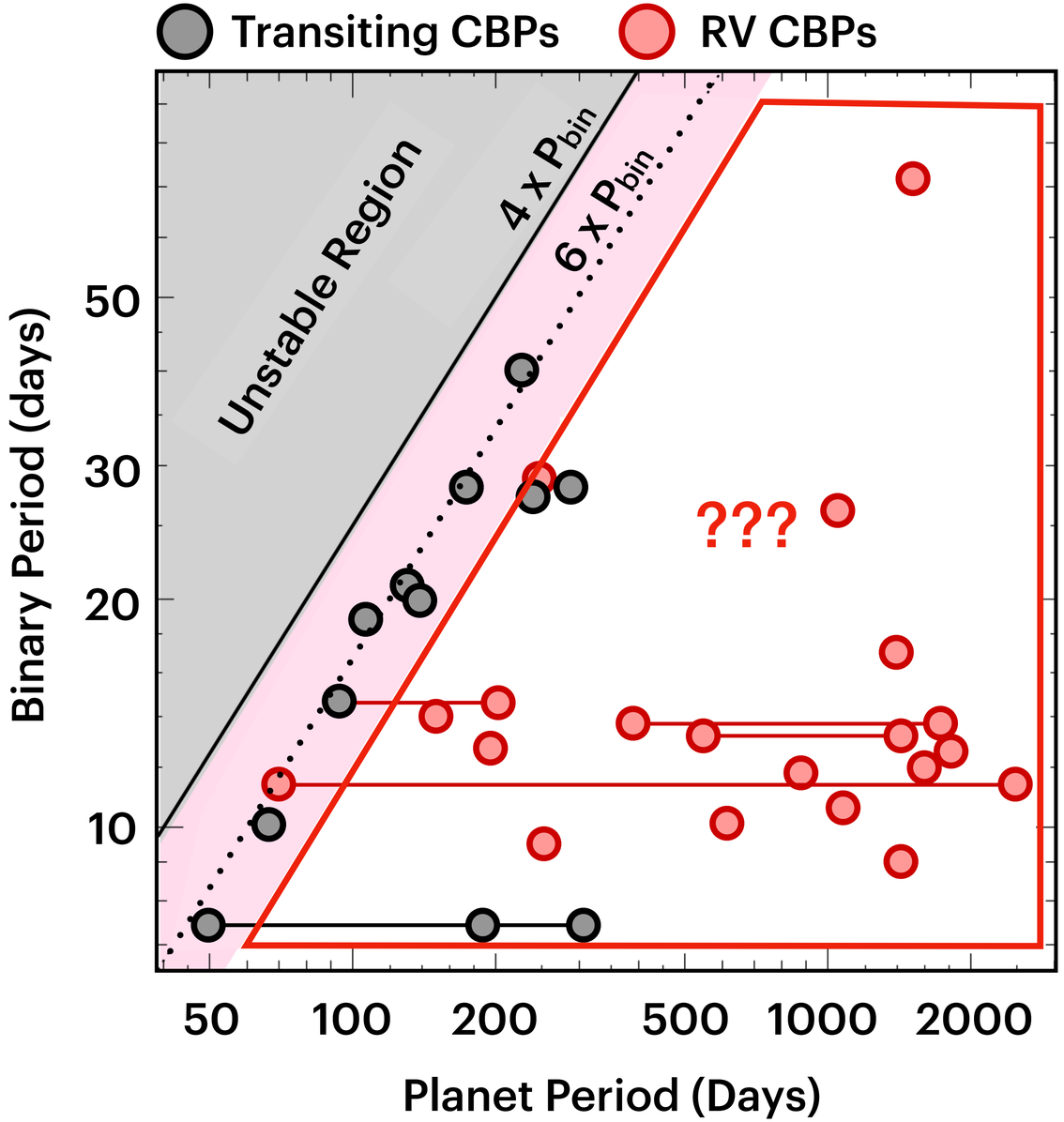

1. No - transits were biased

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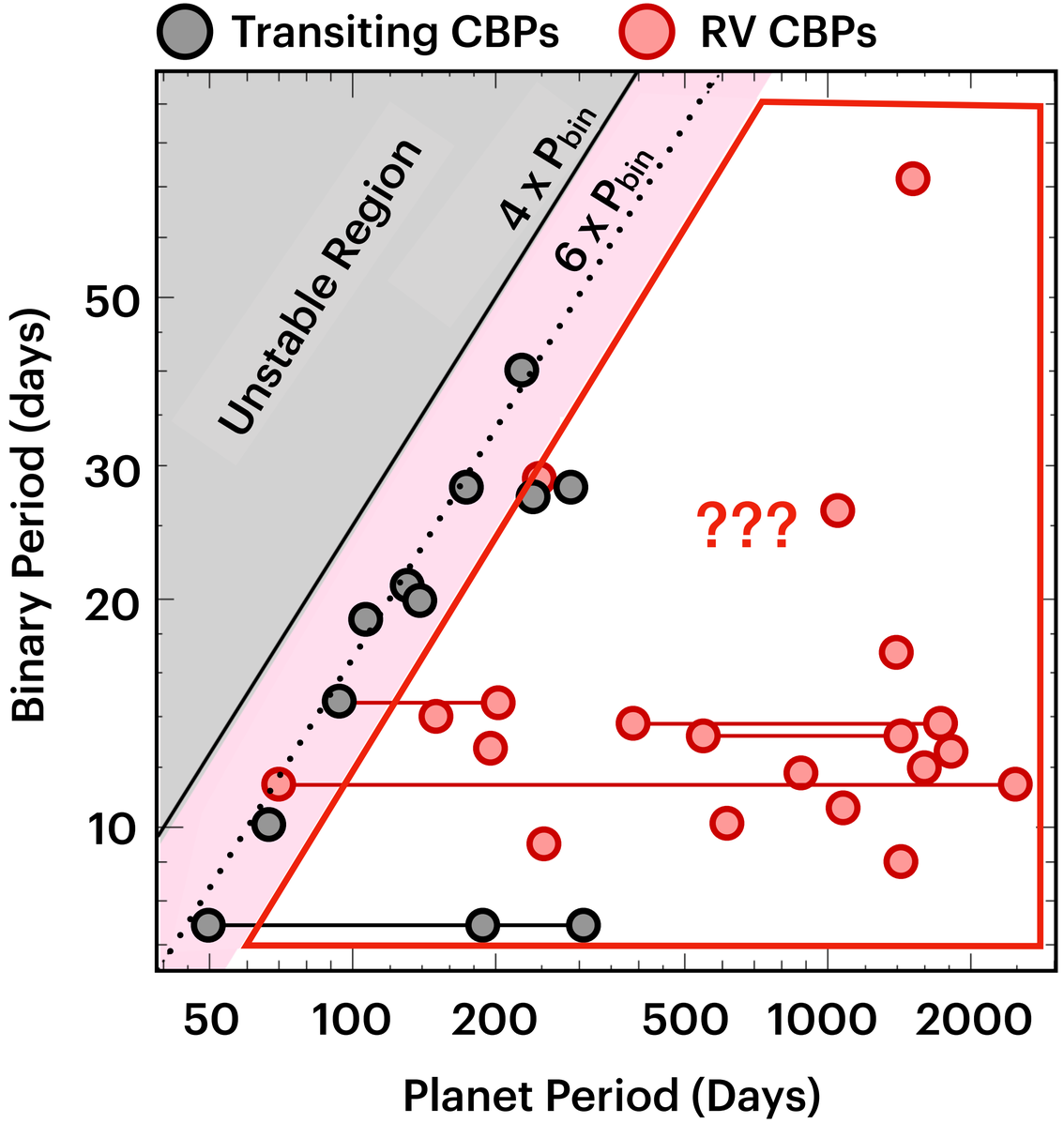

1. No - transits were biased
2. Sort of - RVs probe different planets

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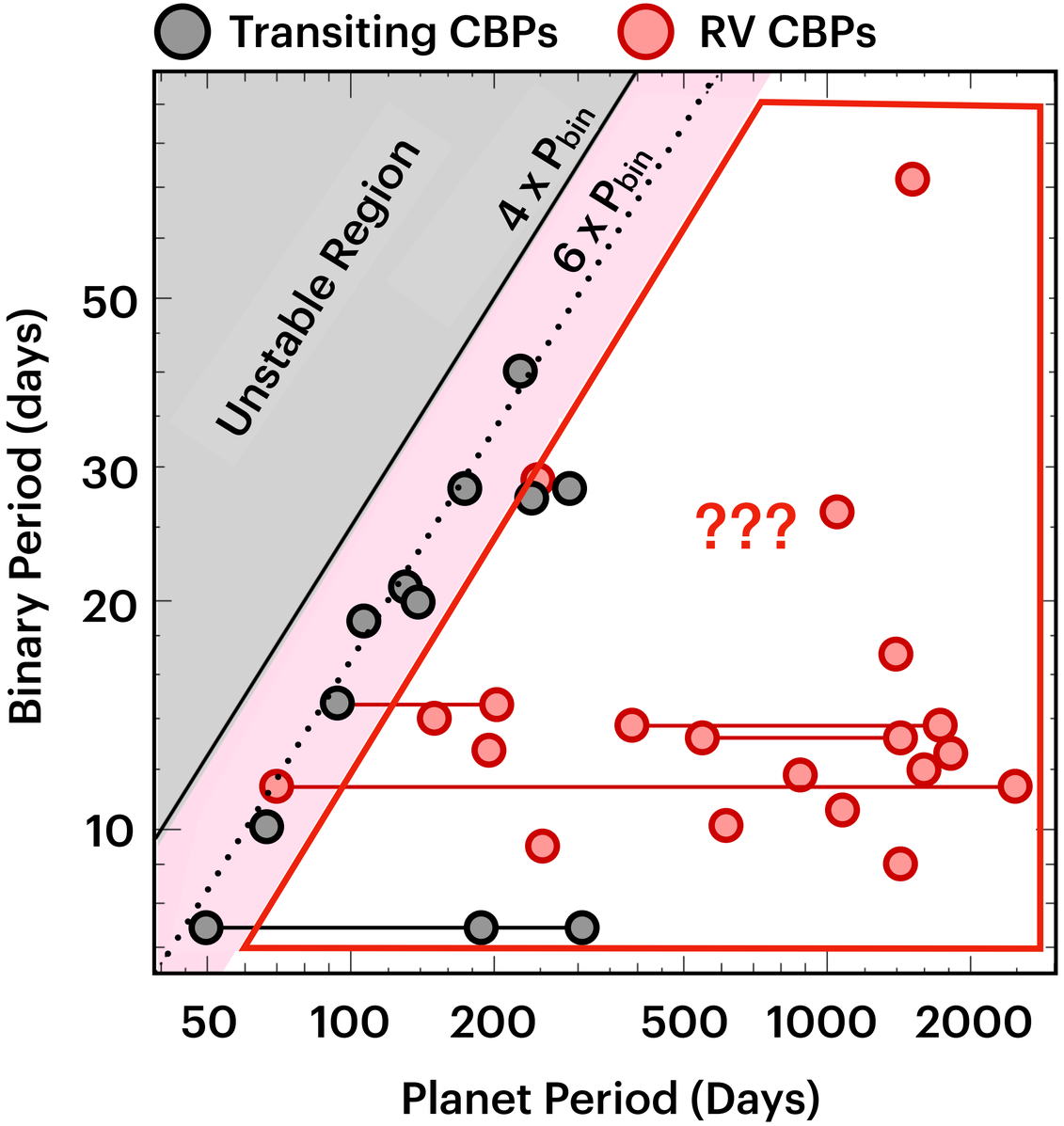

1. No - transits were biased
2. Sort of - RVs probe different planets
3. Yes - RV planets unconfirmed

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Where are the small CBPs?

How big are the orbits?

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Is there a pile-up?

How are the orbits oriented?

What are the binaries like?

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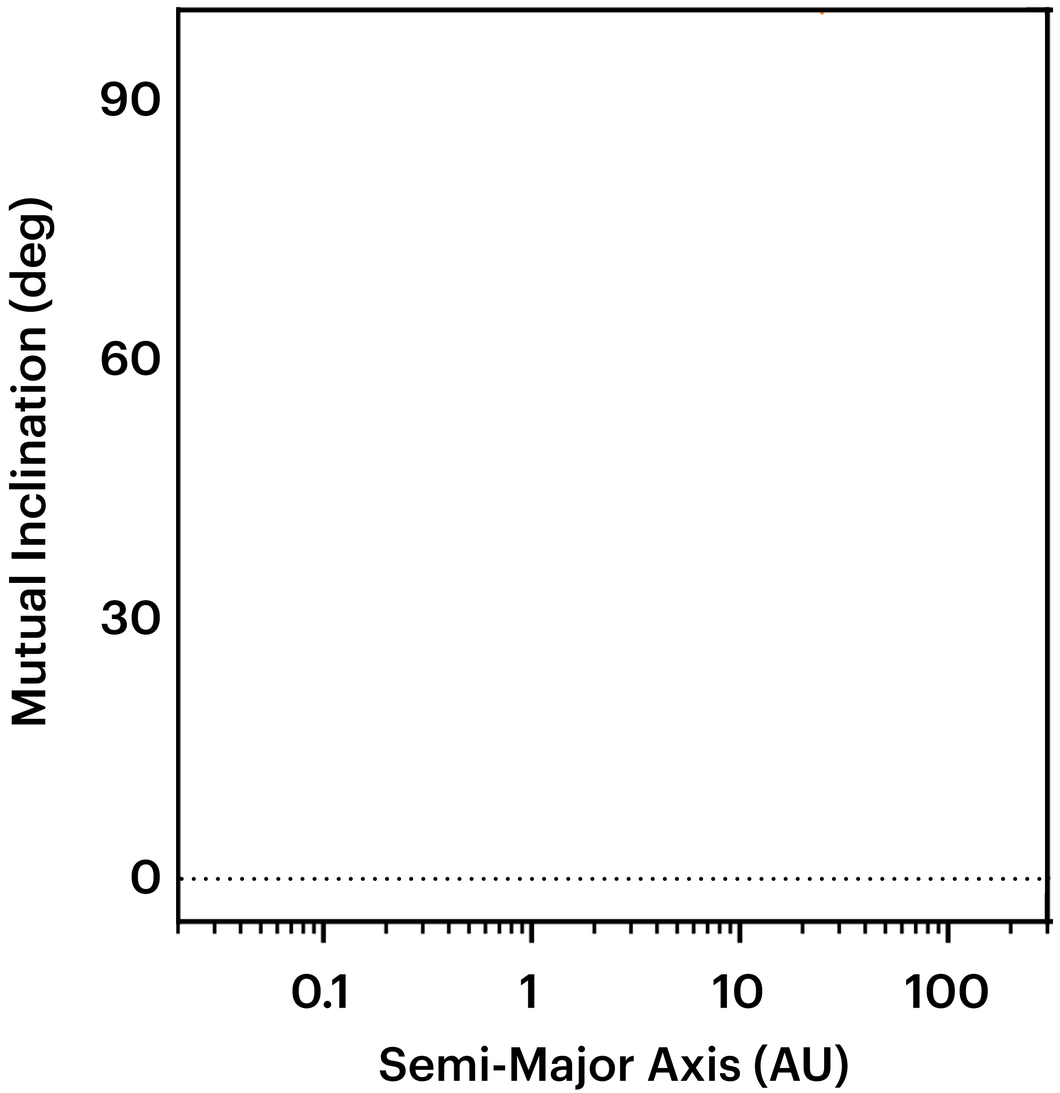

Czekela+ 2019

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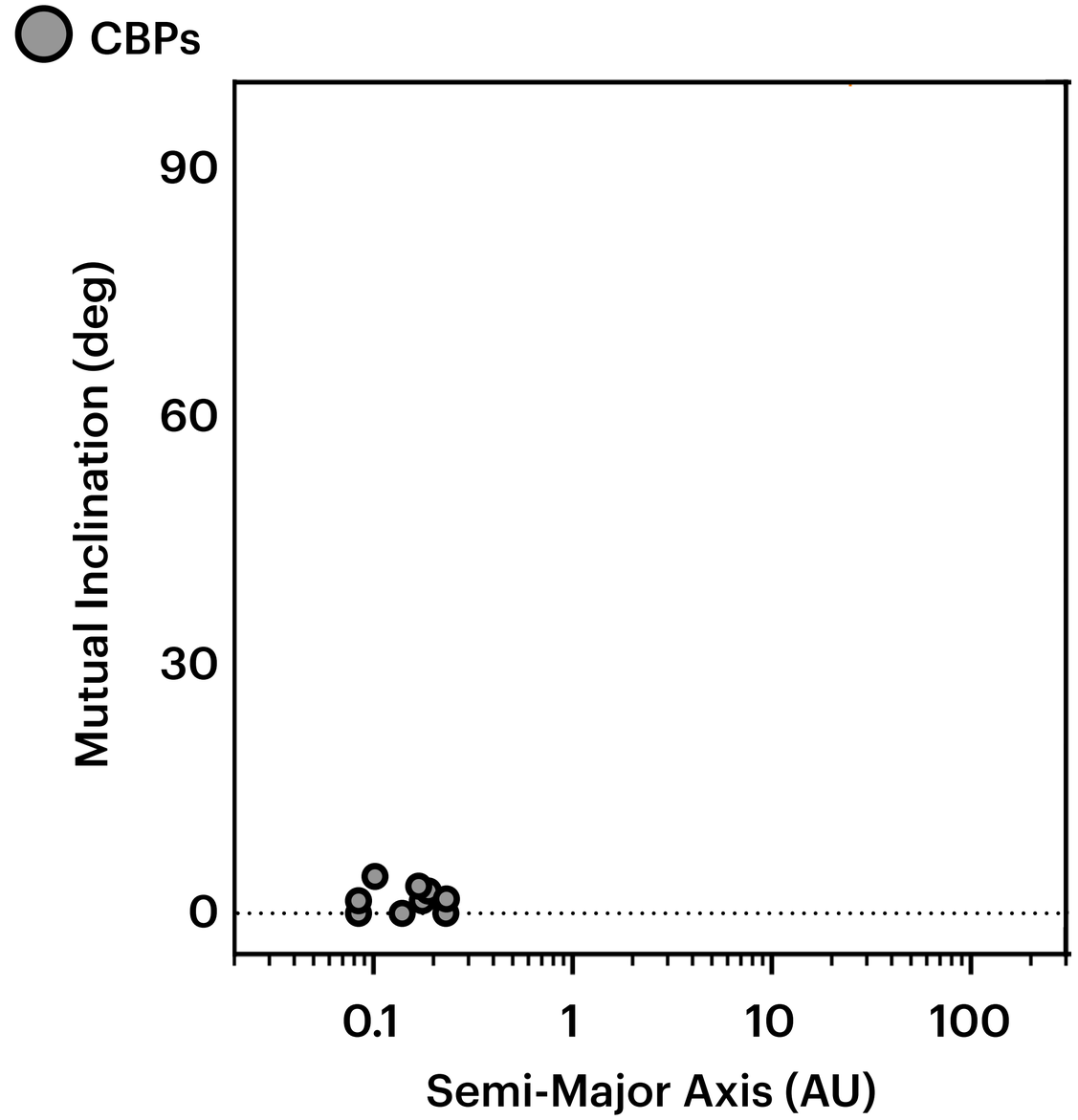

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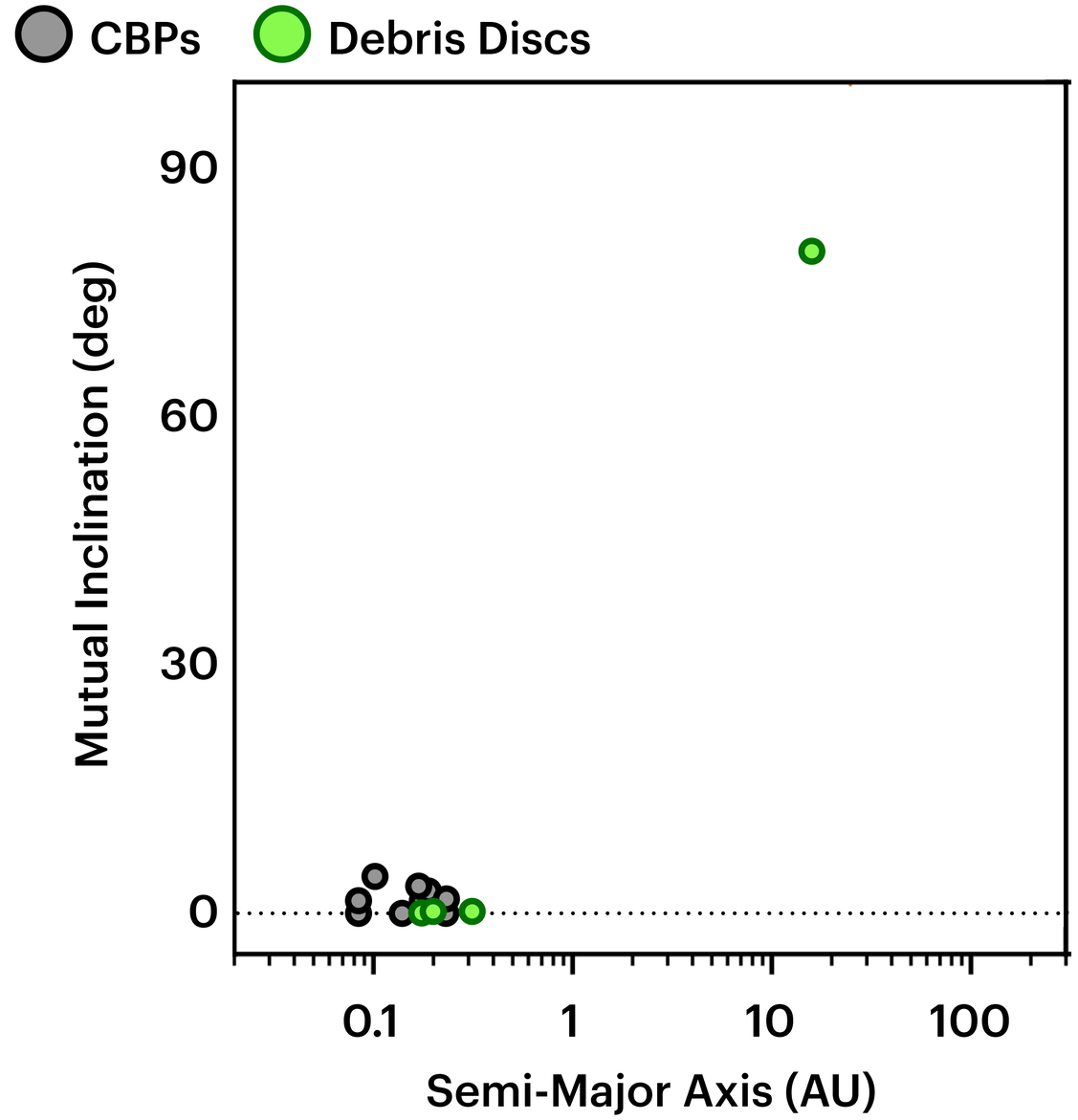

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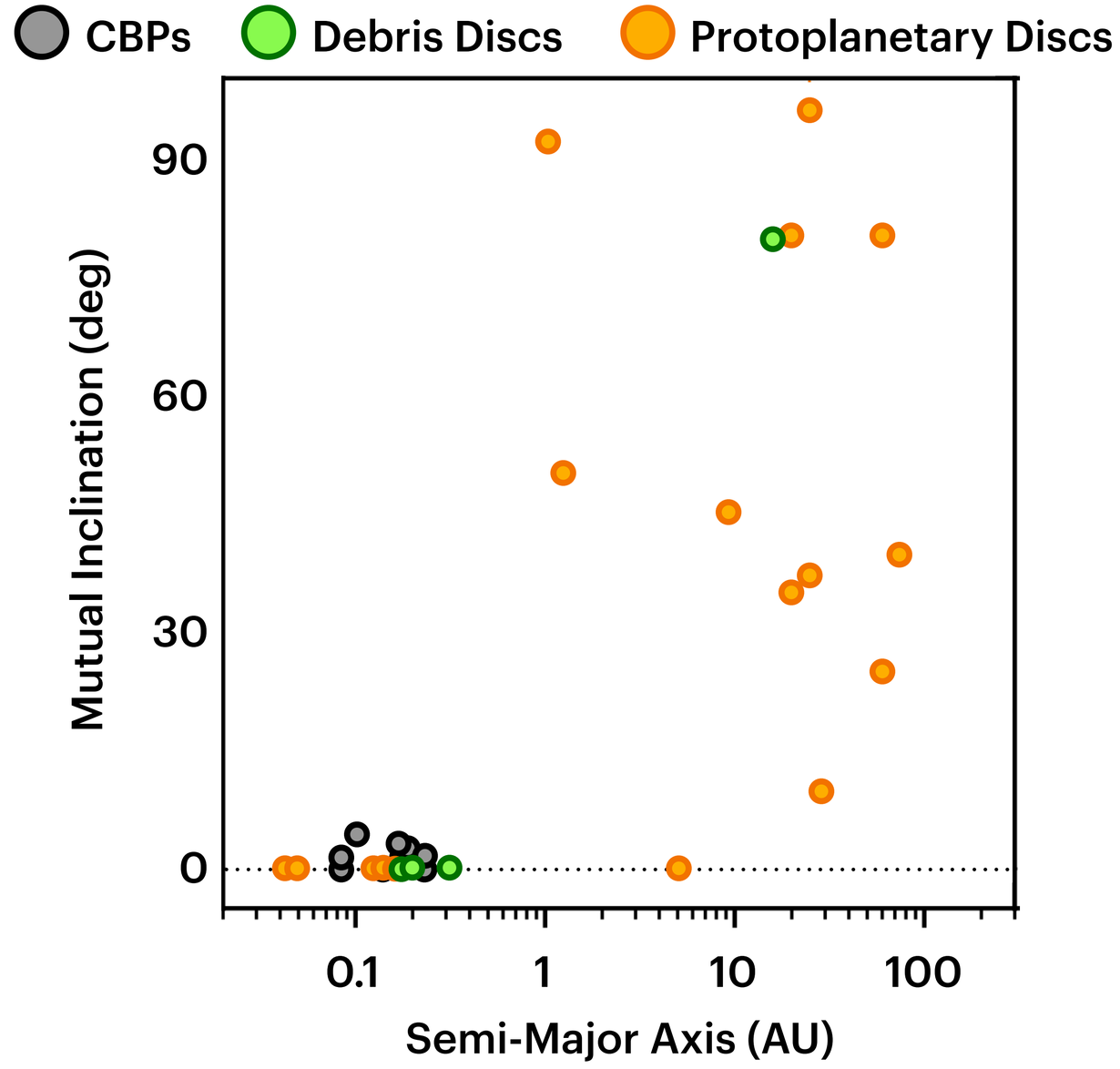

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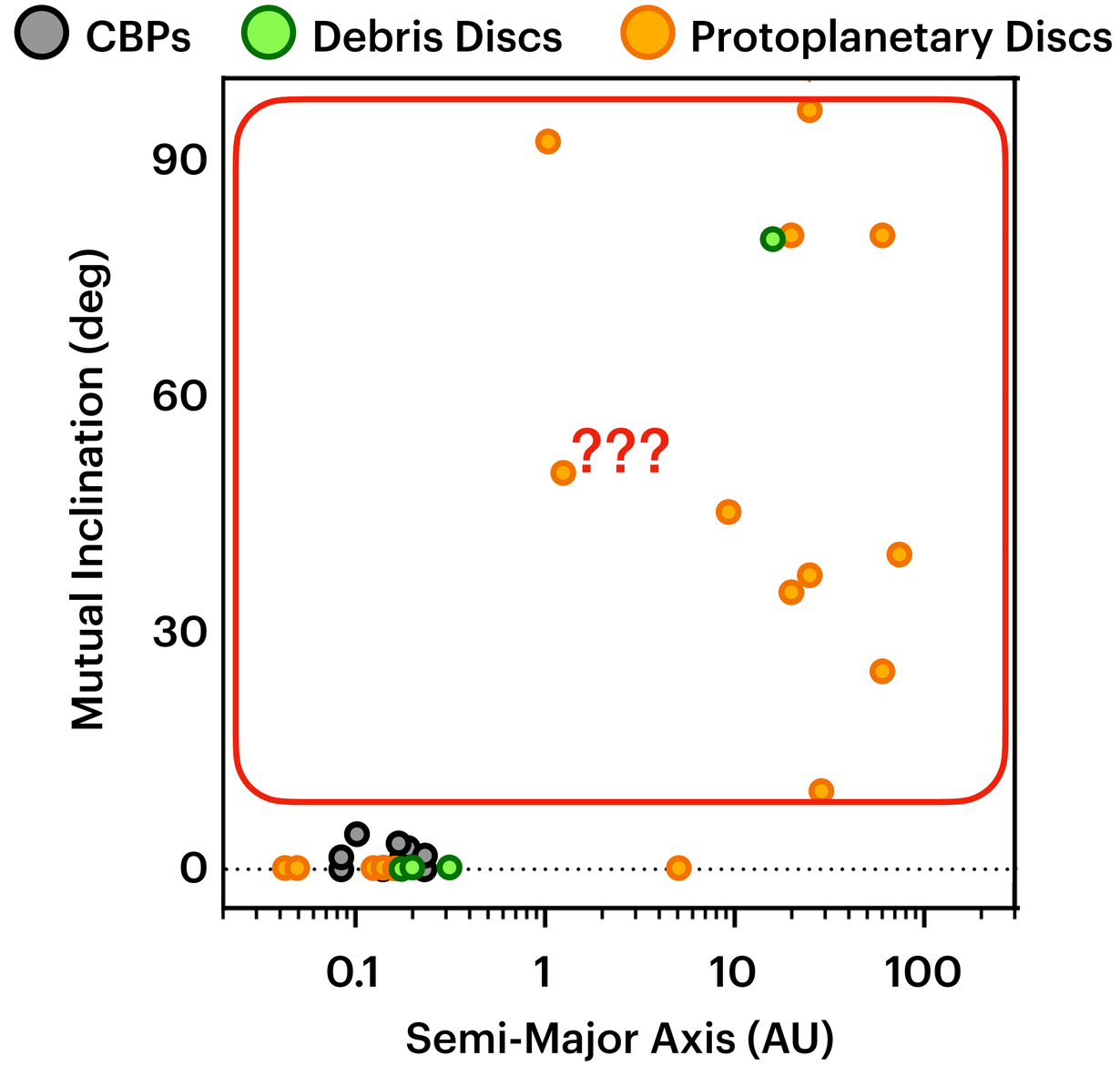
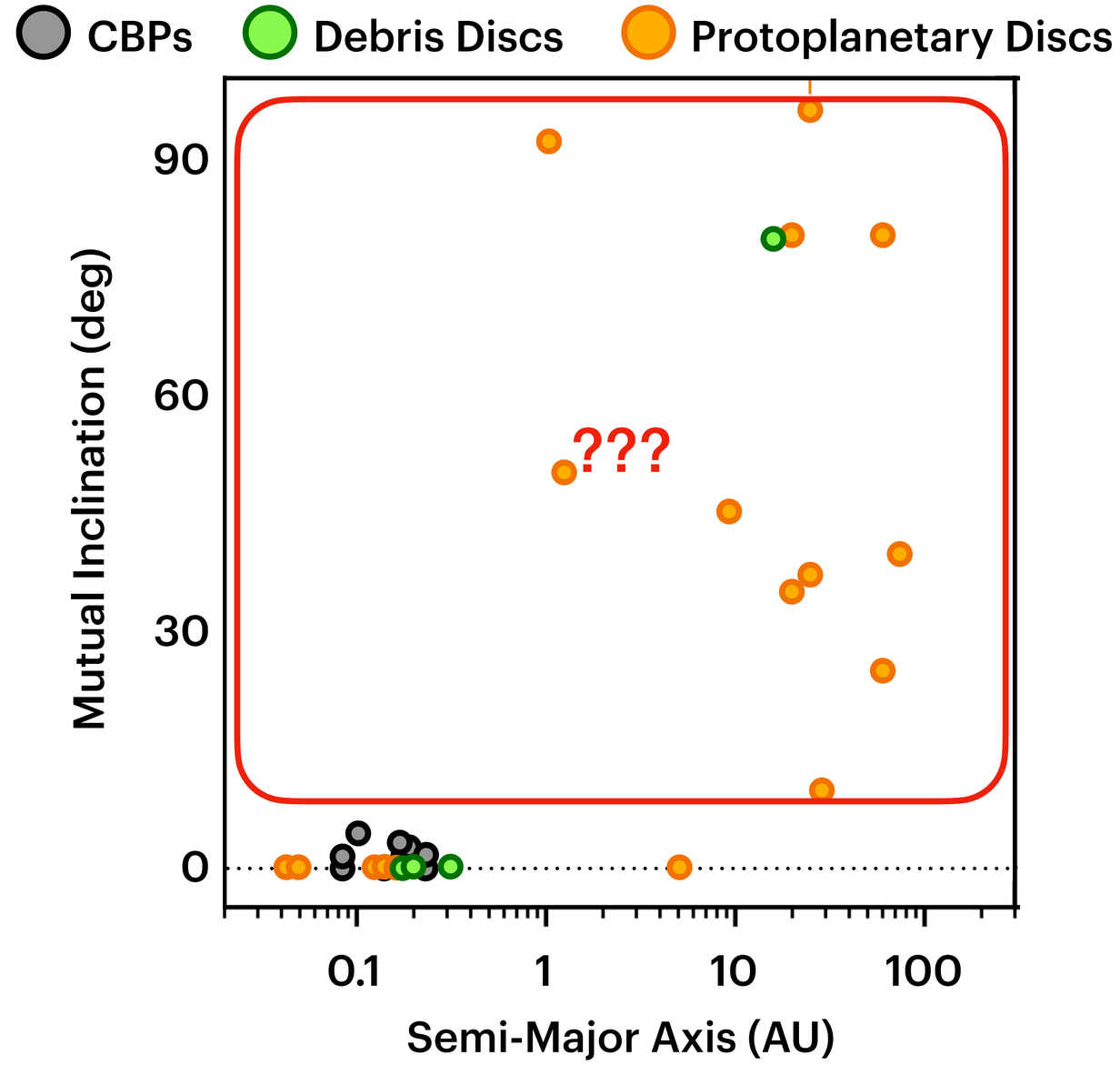


Czekela+ 2019

How can we find misaligned CBPs?



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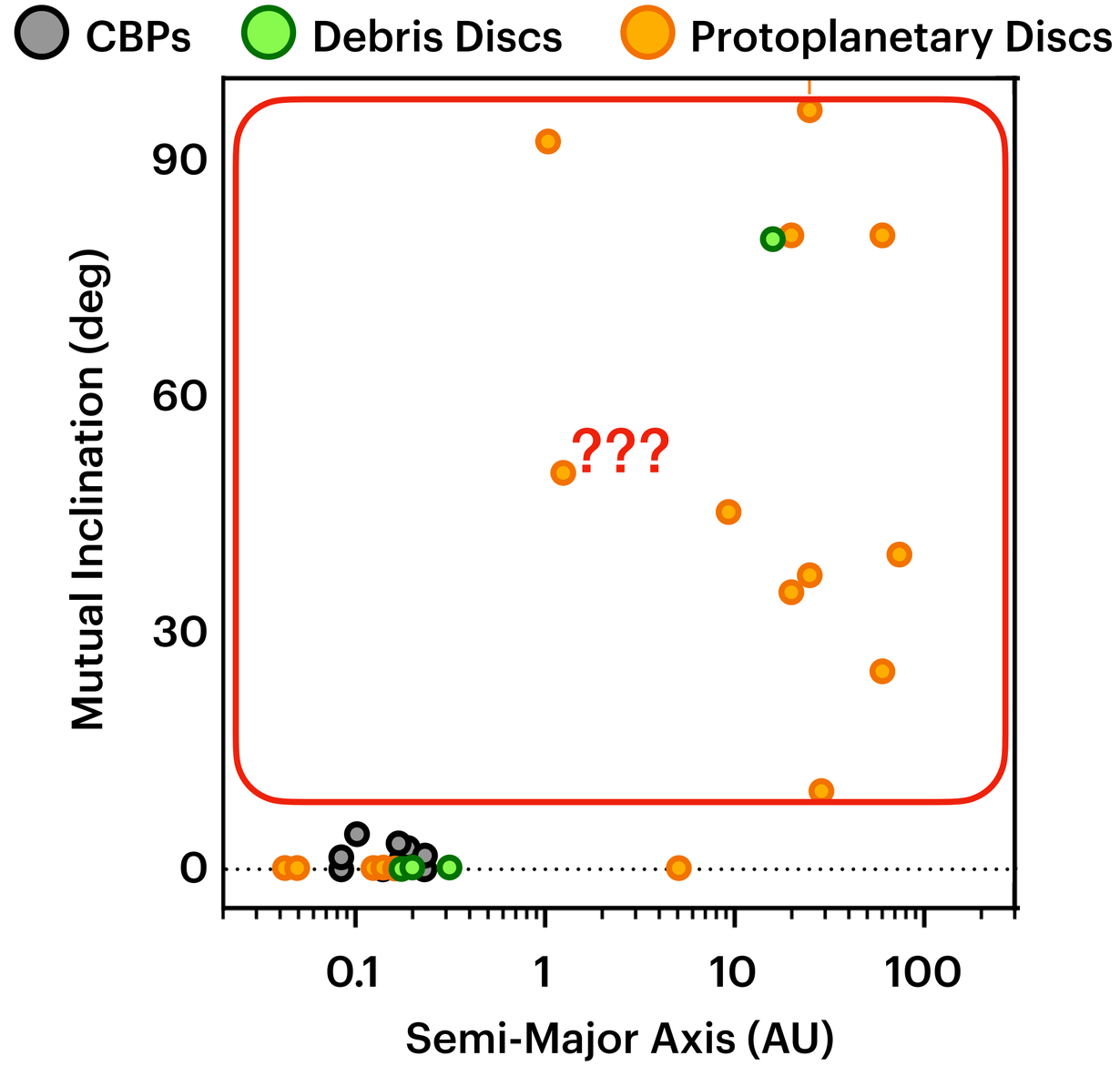
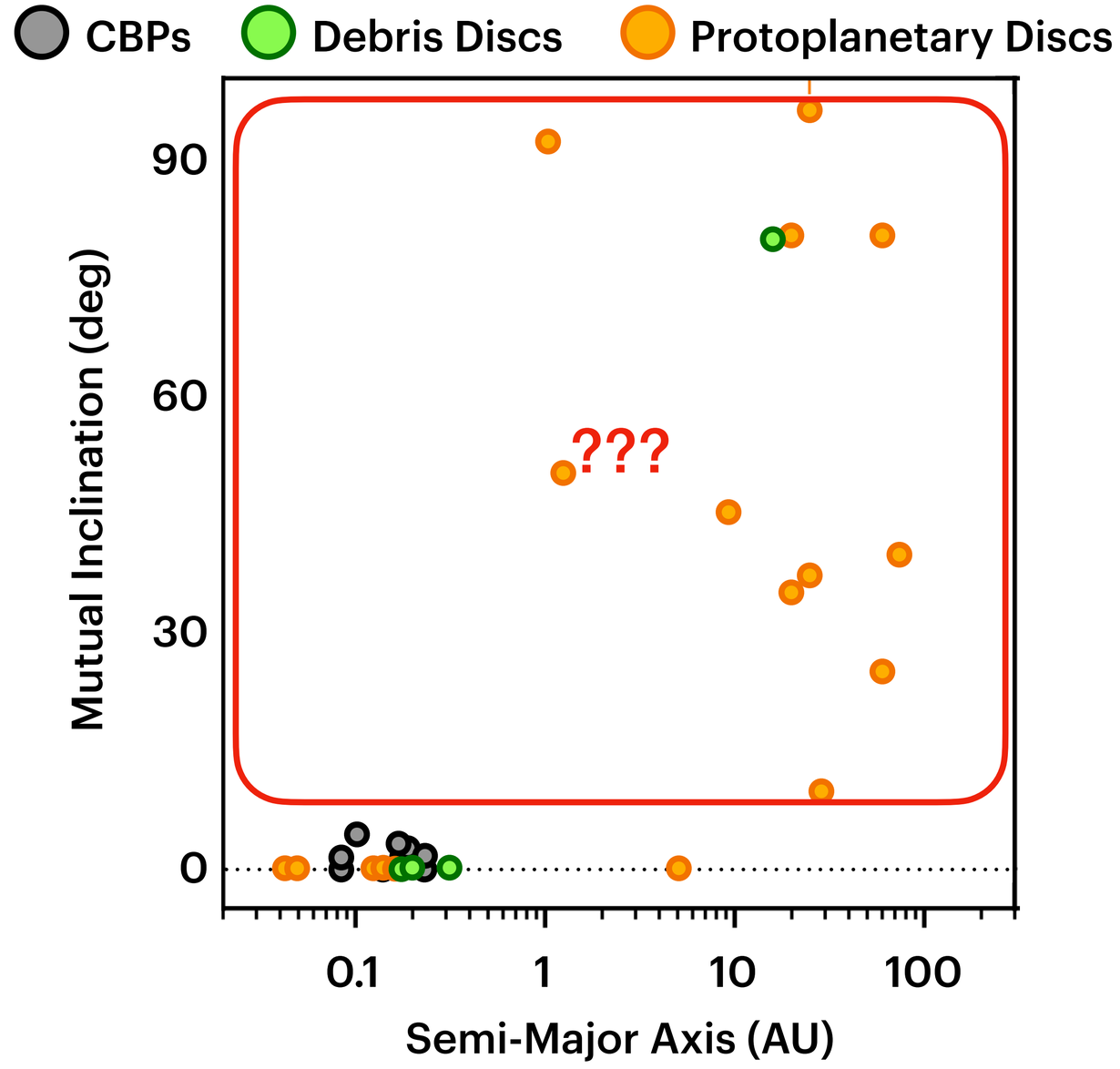


Czekela+ 2019

1. ETVs

How can we find misaligned CBPs?



Czekela+ 2019

1. ETVs
2. PTANEBs

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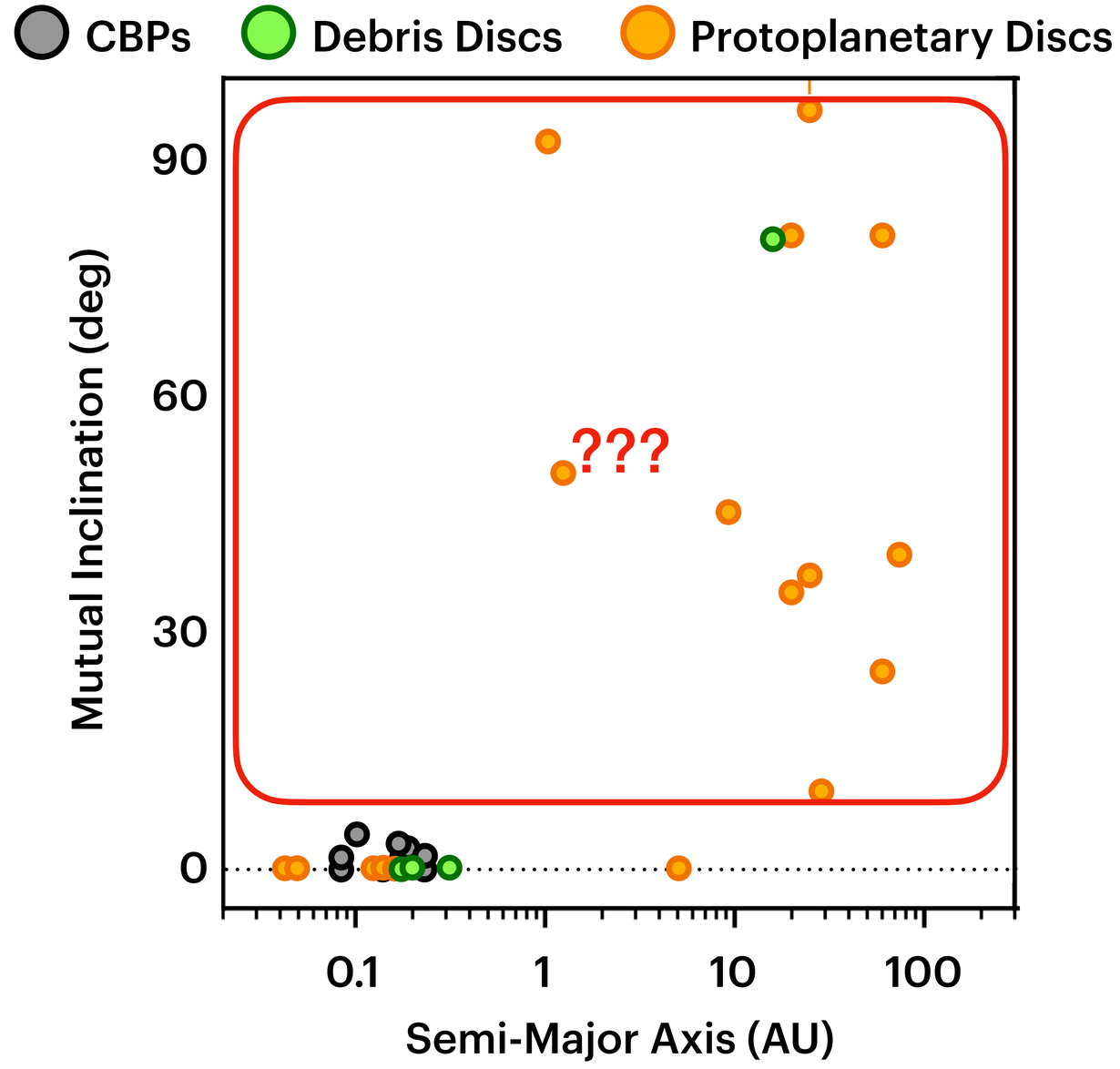

Czekela+ 2019

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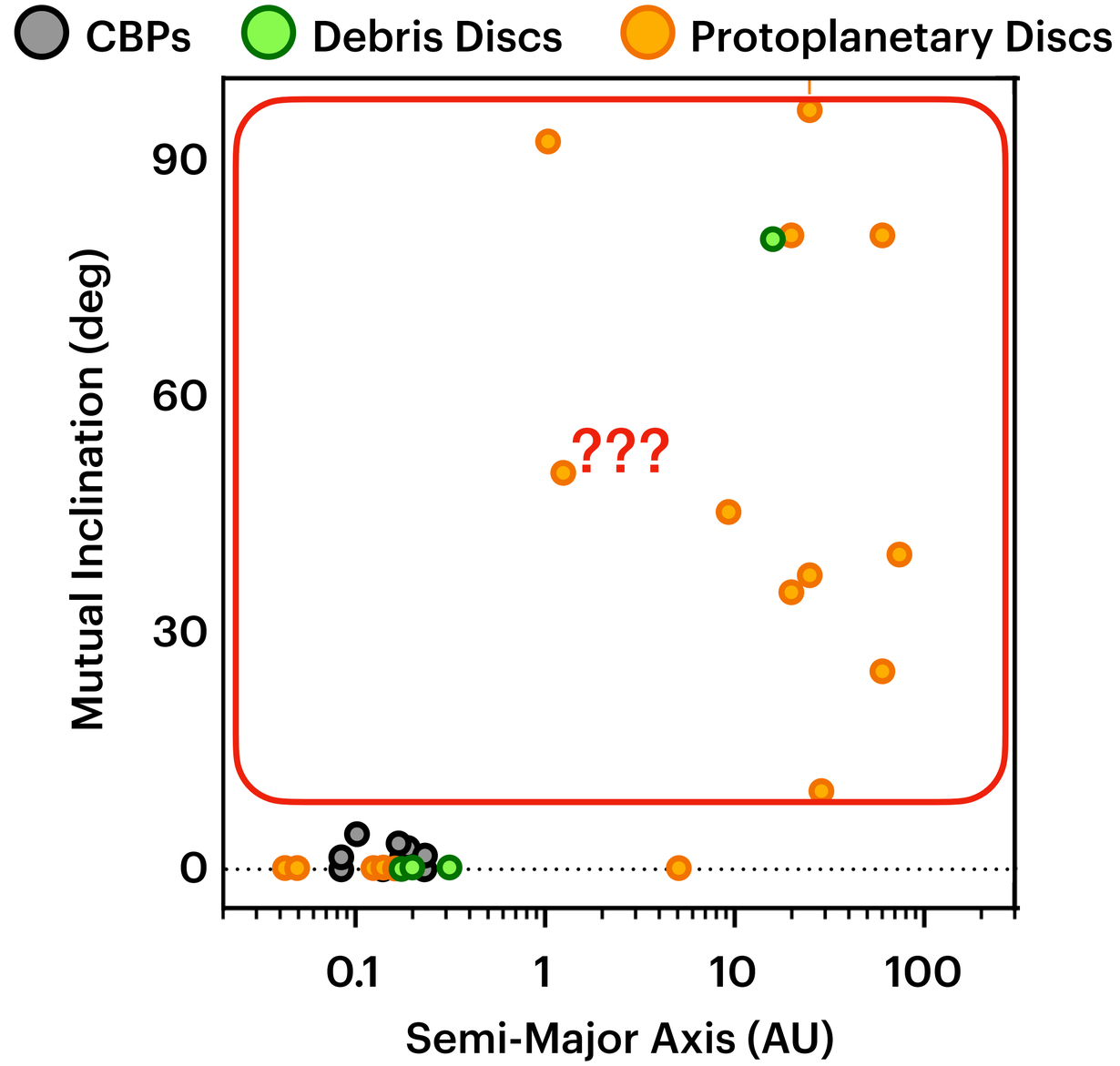

Czekela+ 2019

1. ETVs
2. PTANEBs
3. RVs
4. Gaia

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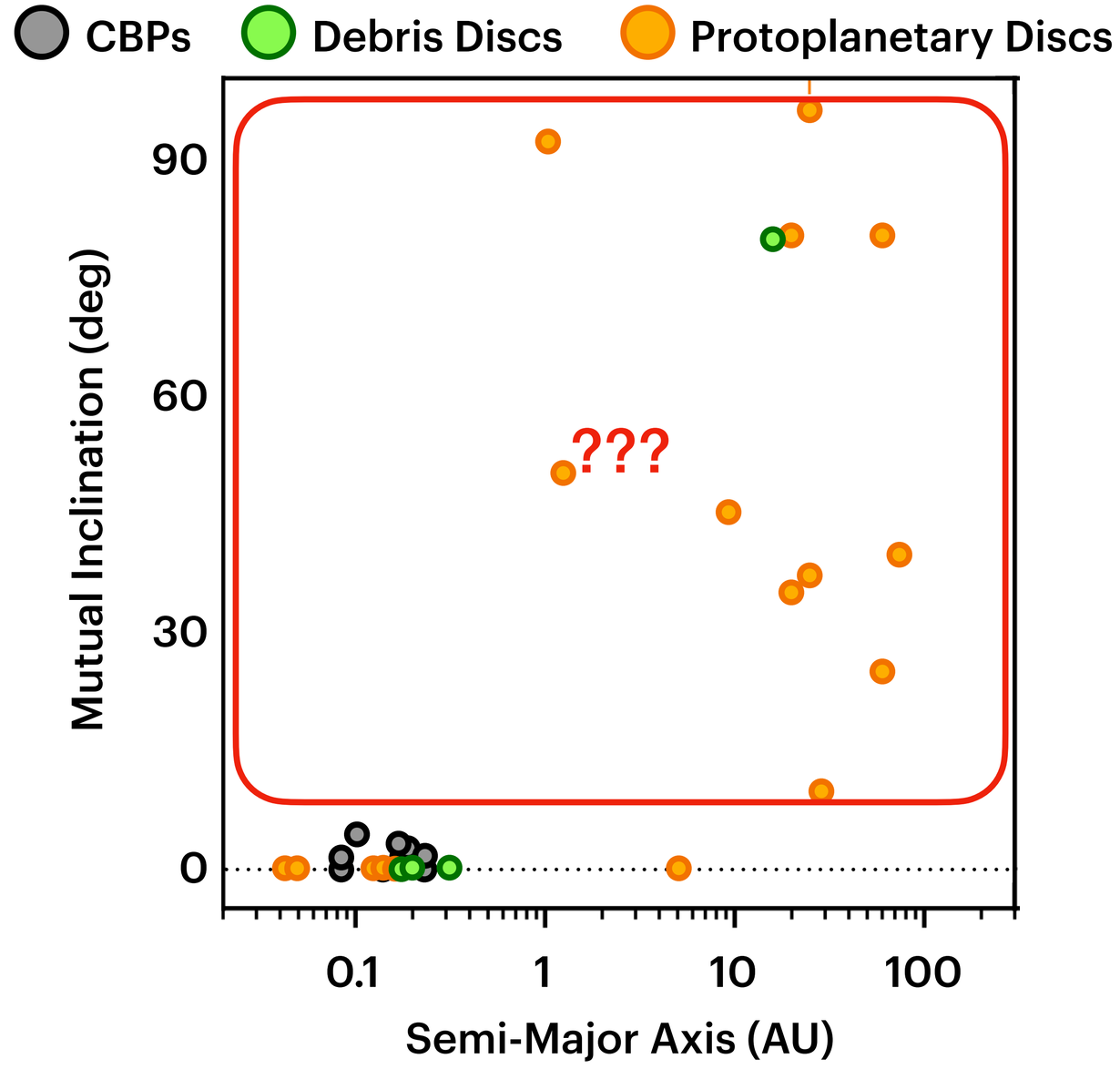

Czekela+ 2019

1. ETVs
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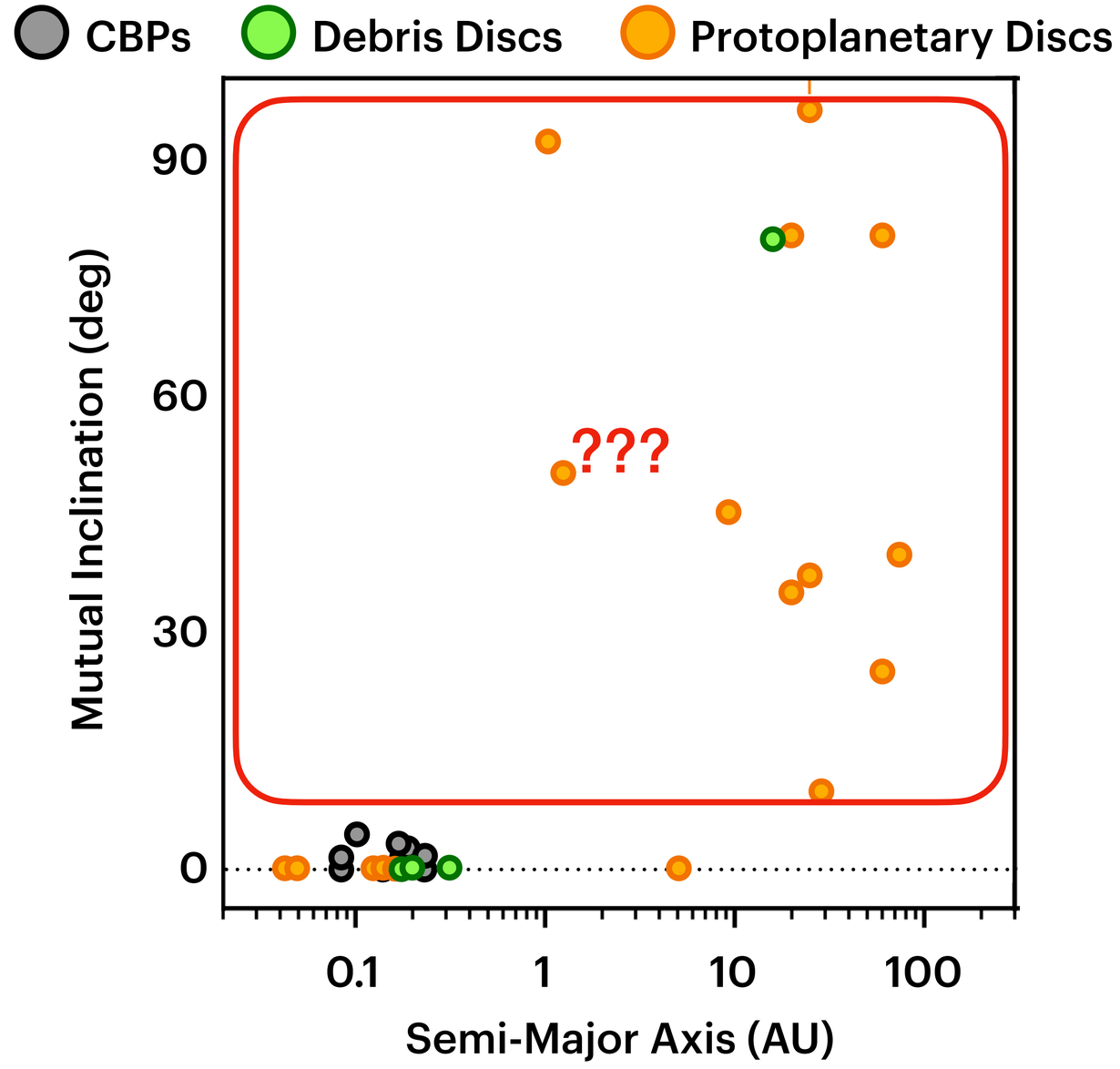
5. Microlensing

How can we find misaligned CBPs?



Czekela+ 2019

1. ETVs
2. PTANEBs
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4. Gaia
5. Microlensing
6. Discs

How big are the planets?

↓

Where are the small CBPs?

How big are the orbits?

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Is there a pile-up?

How are the orbits oriented?

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How can we find misaligned CBPs?

What are the binaries like?

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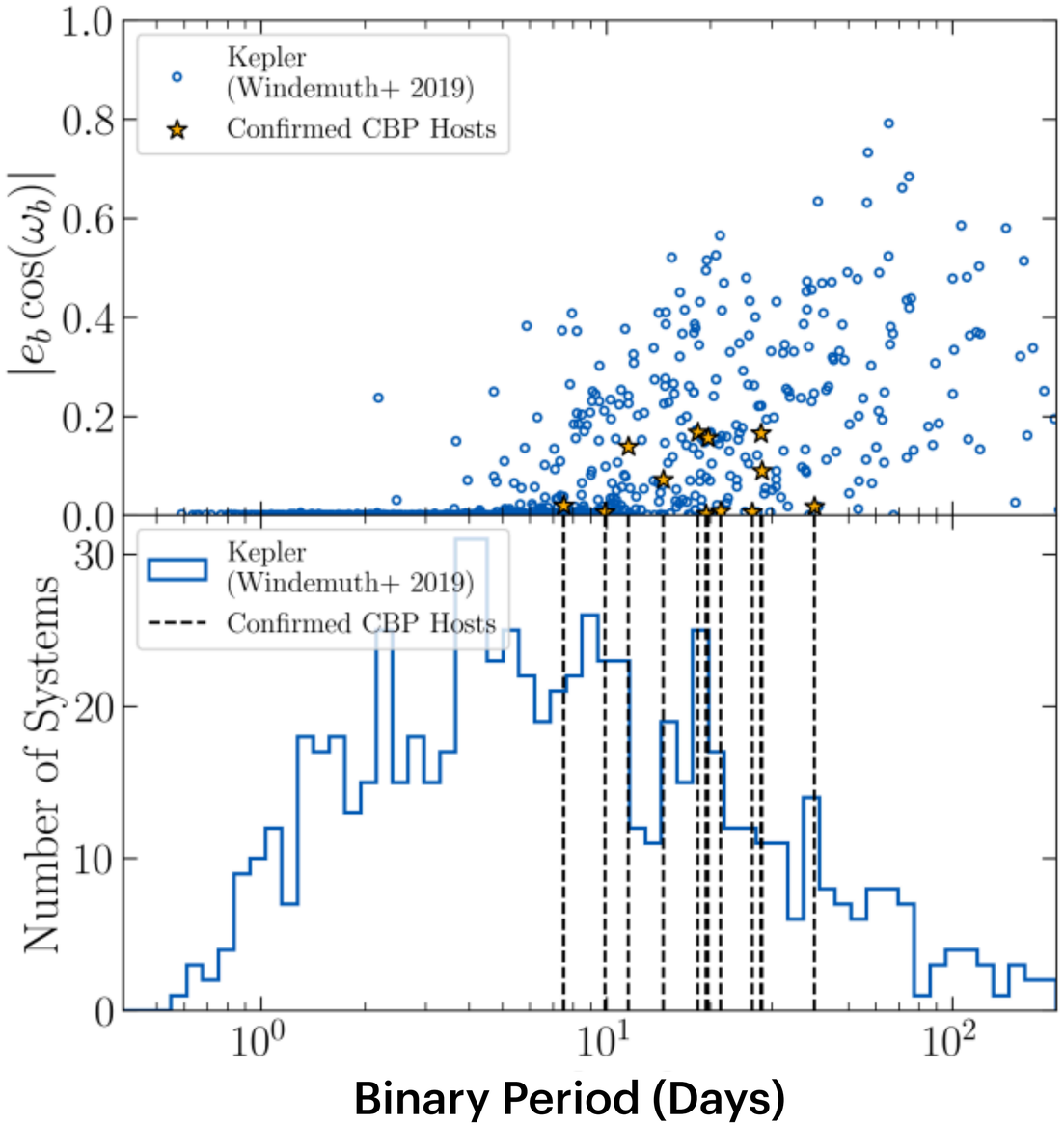
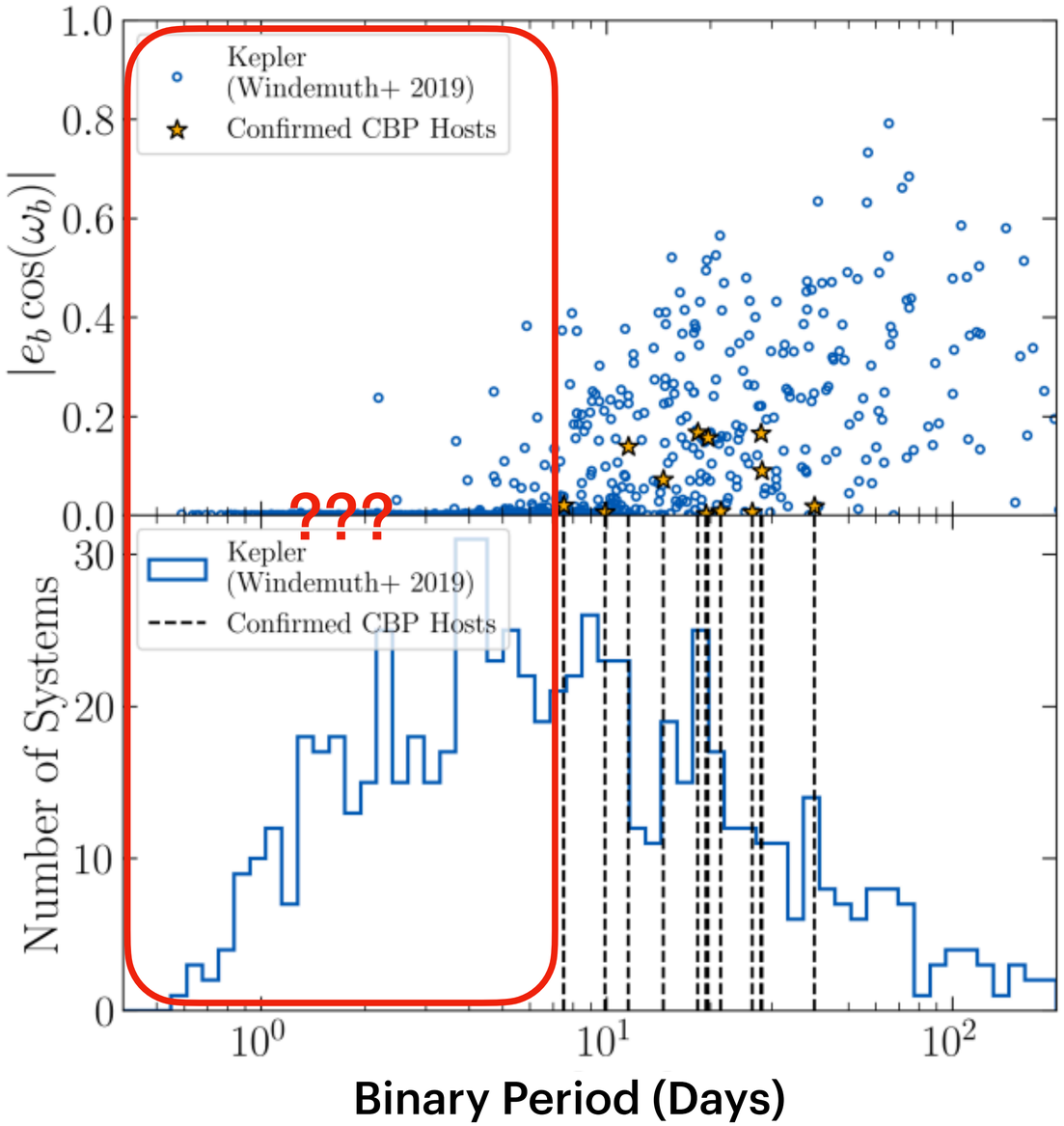


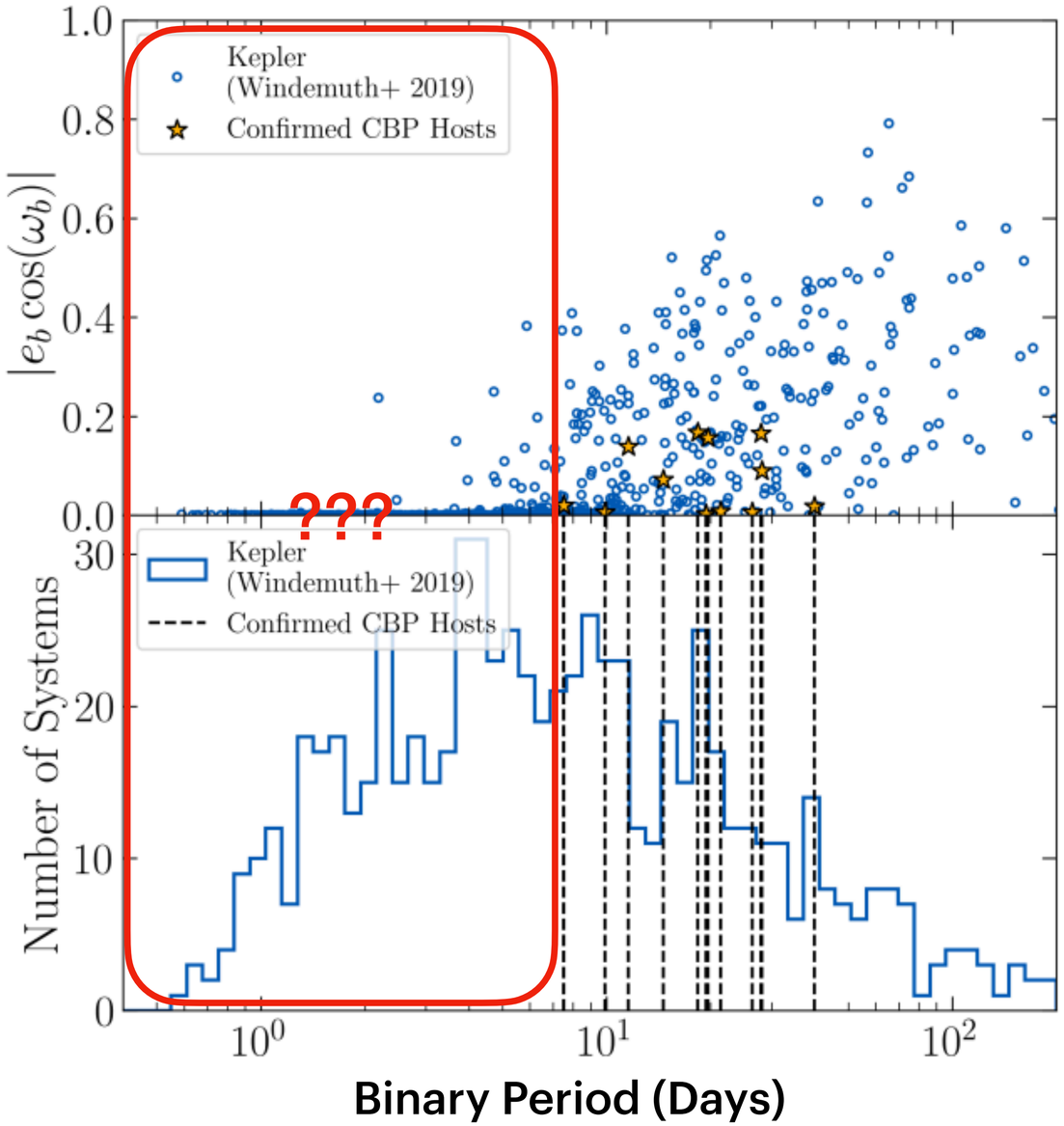
Mogan & Zanazzi 2024

What are the binaries like?



Mogan & Zanazzi 2024

Where are the tight-binary planets?



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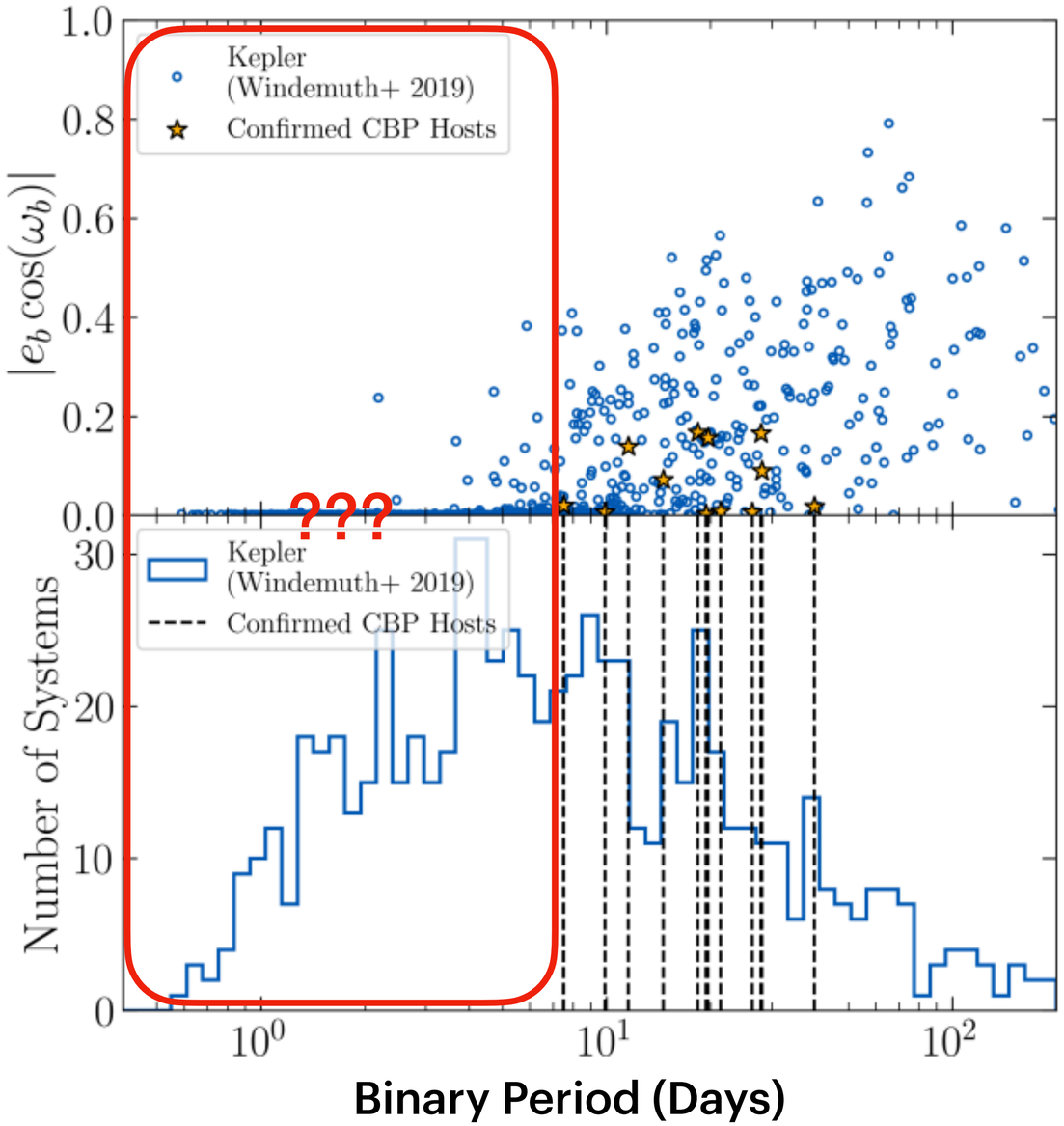

1. Tight binaries form in triples → kills CBPs

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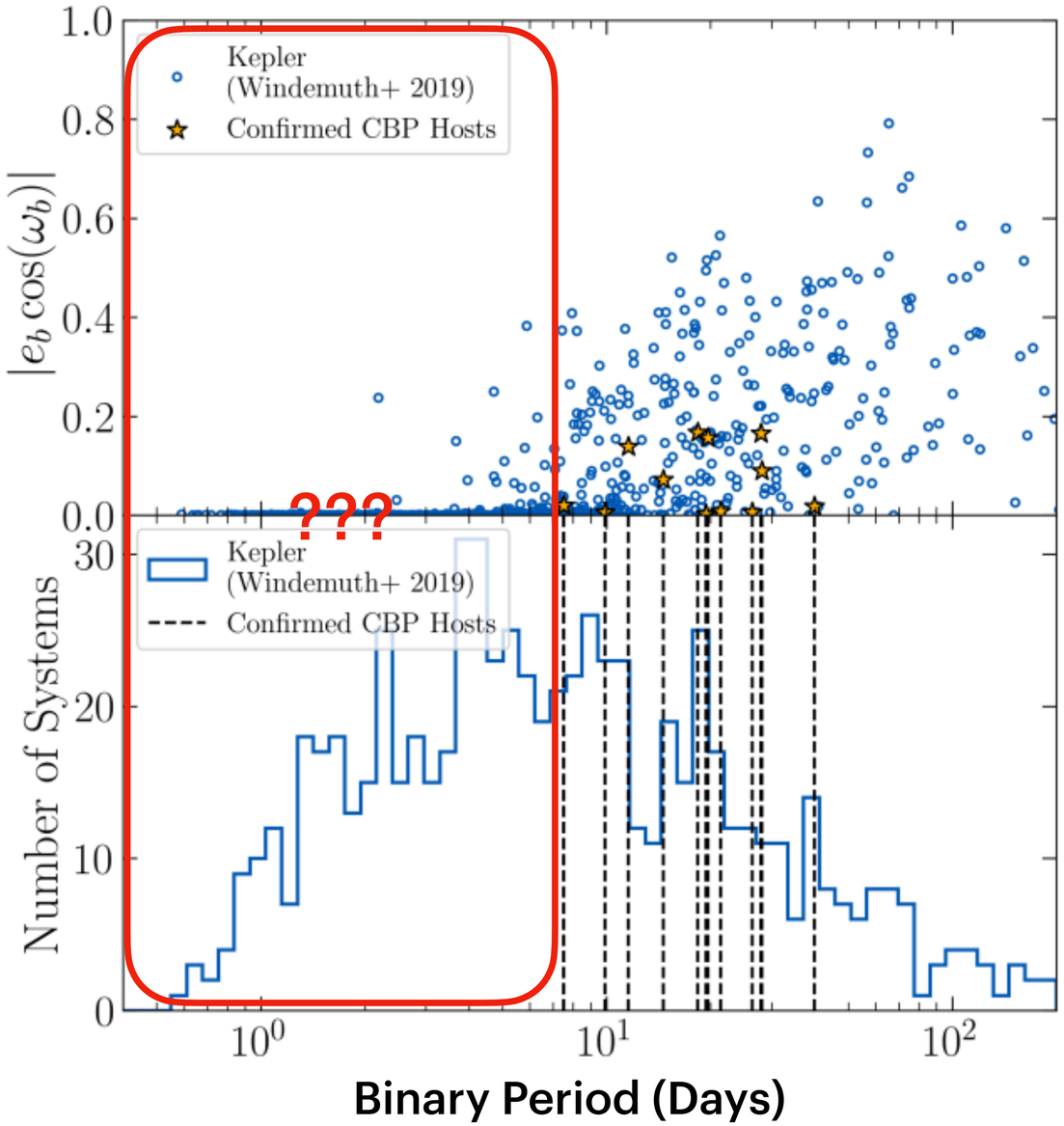

1. Tight binaries form in triples → kills CBPs
2. Misaligned CBPs around tight binaries

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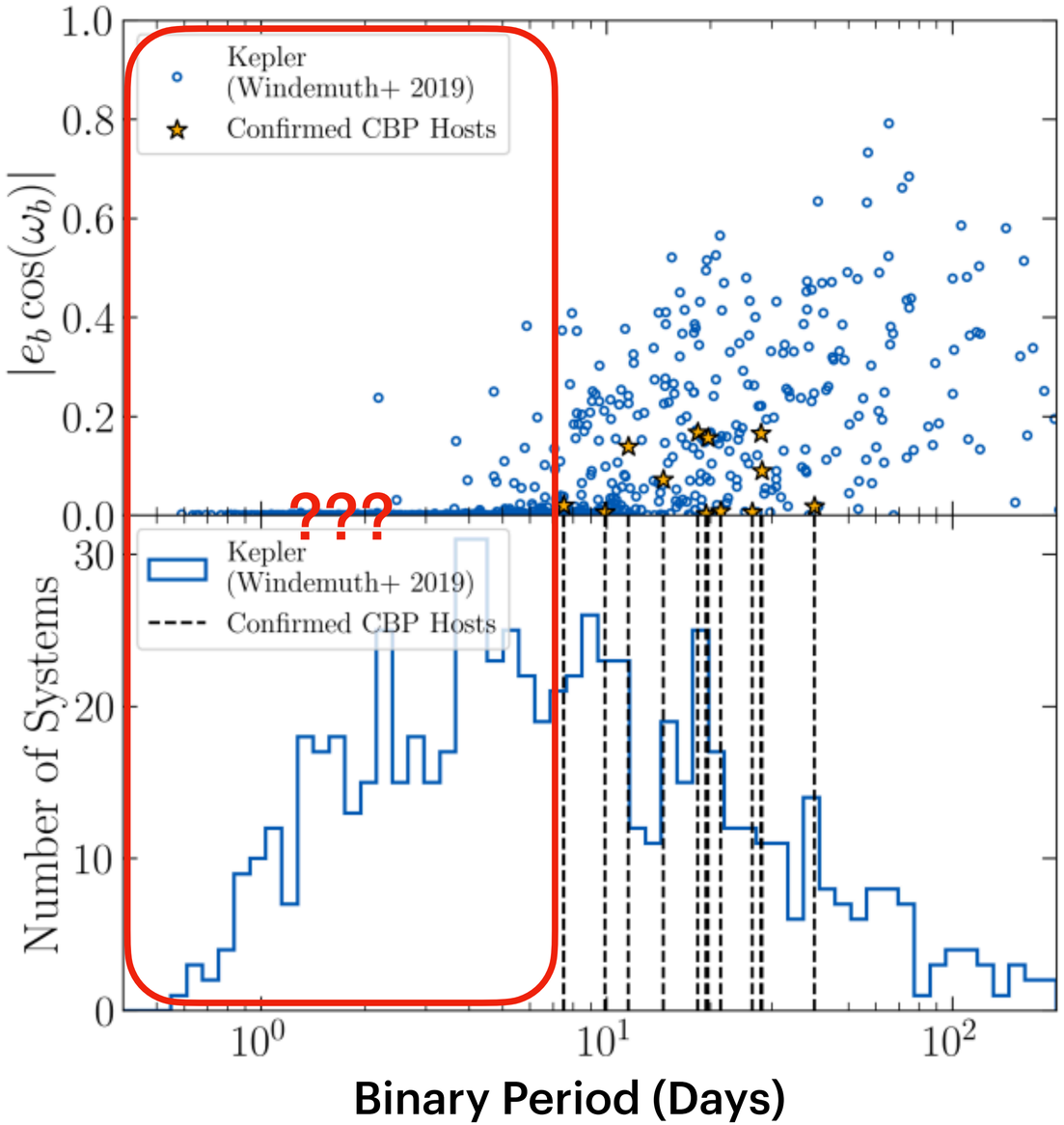

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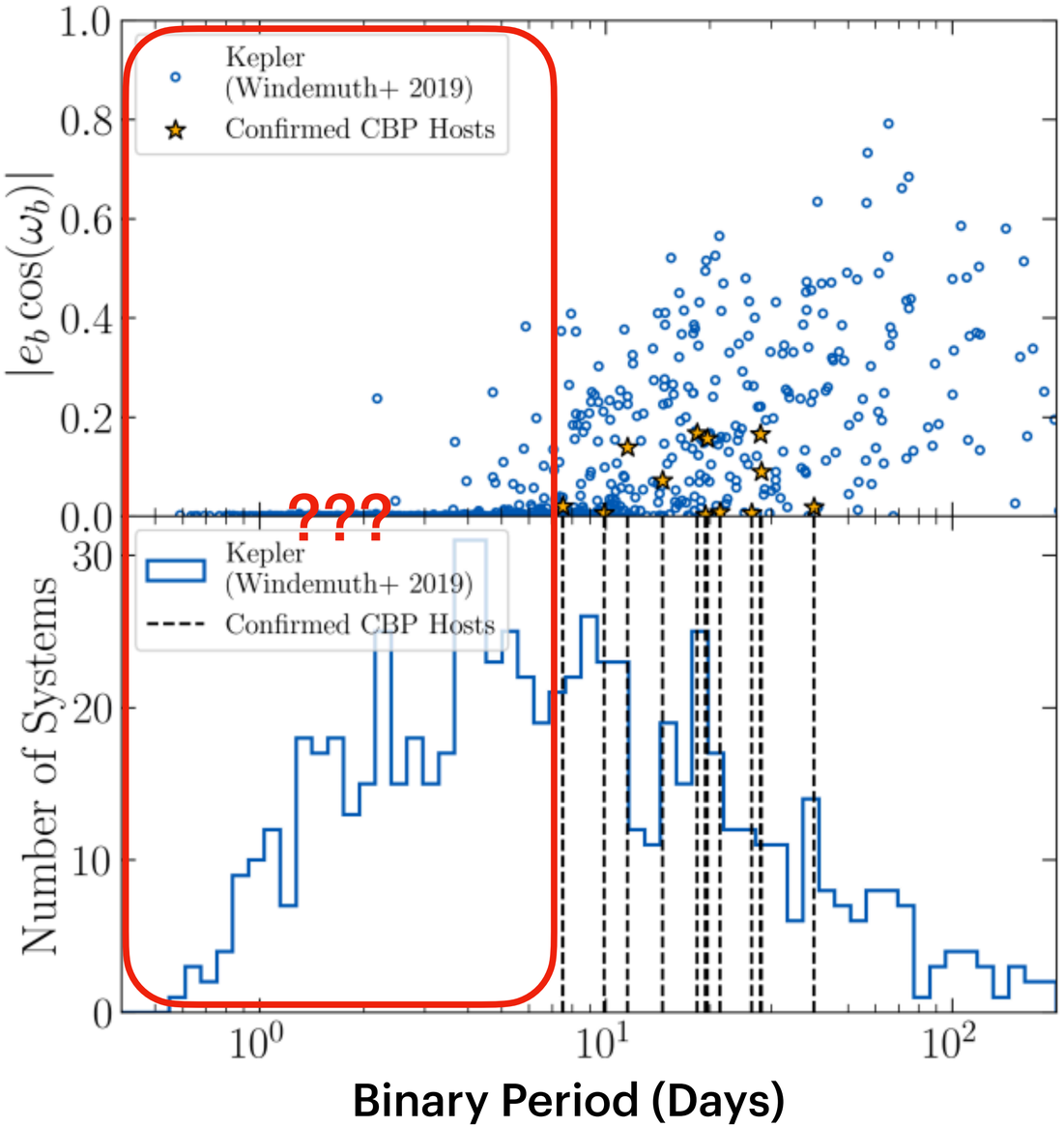

1. Tight binaries form in triples → kills CBPs
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4. Tidal binary shrinkage kills planets

Mogan & Zanazzi 2024

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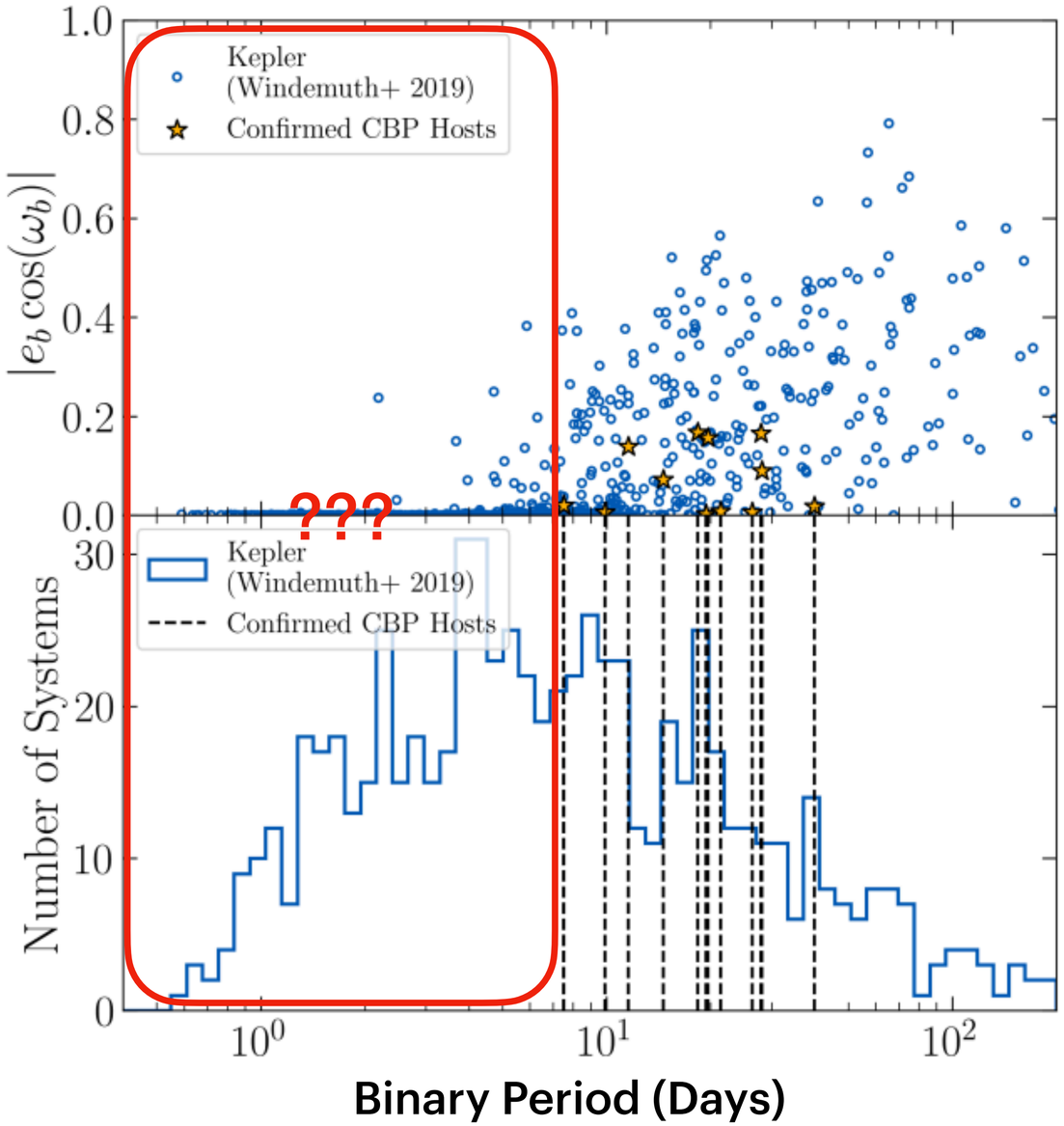

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Mogan & Zanazzi 2024

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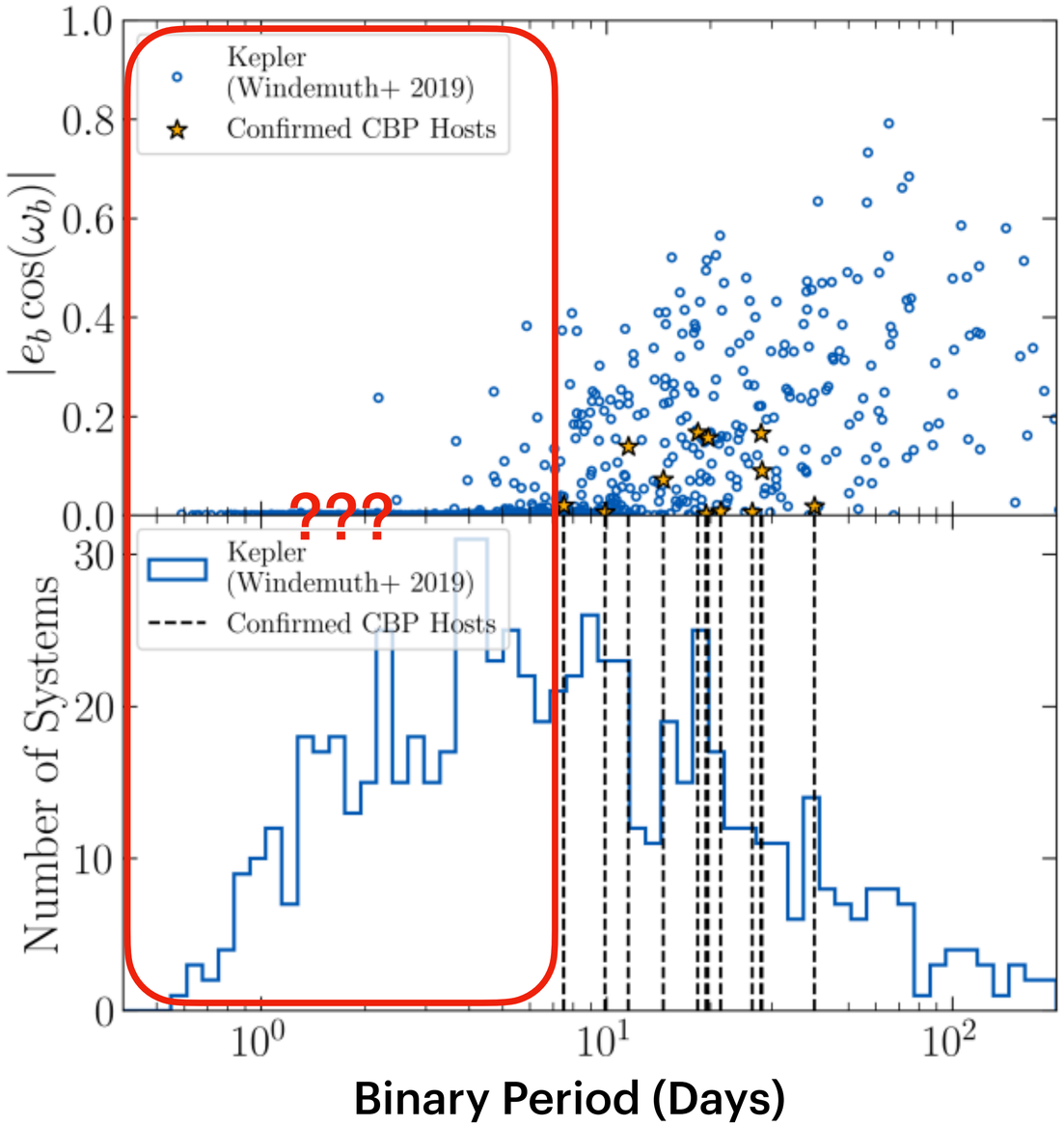

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6. Observing bias - RVs

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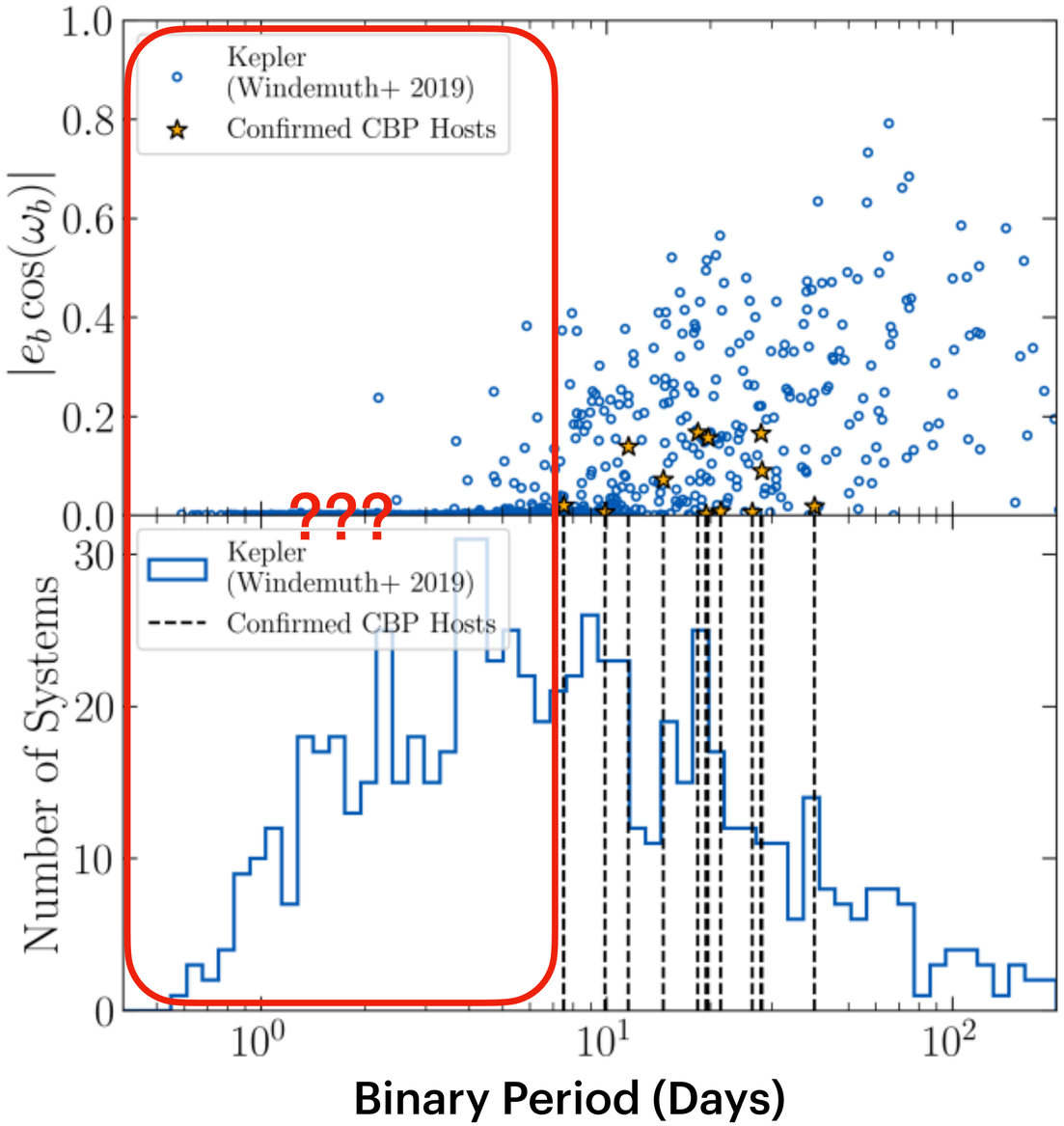

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7. Observing bias - transits

Mogan & Zanazzi 2024

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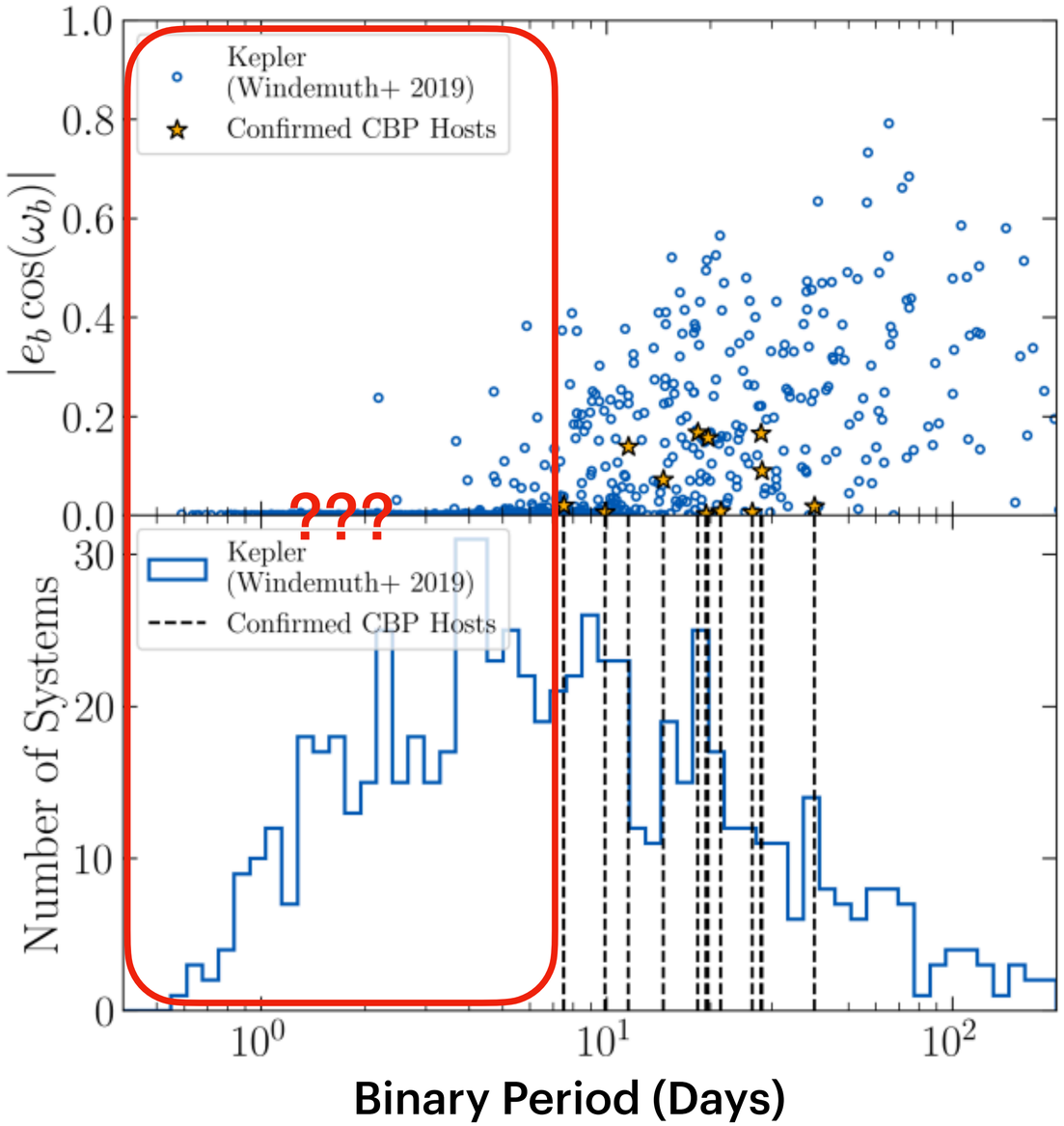

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Mogan & Zanazzi 2024

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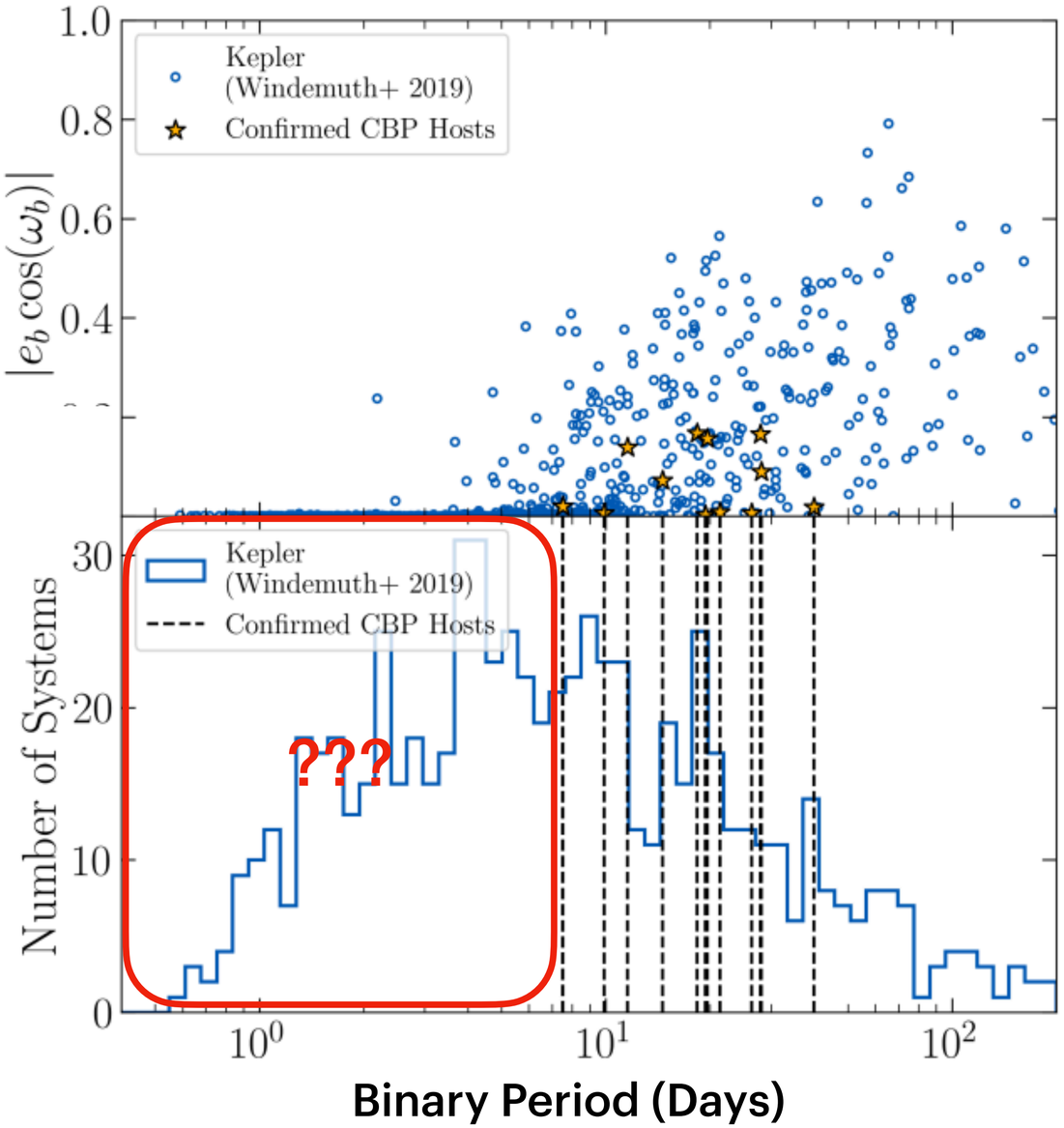

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How big are the planets?

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Where are the small CBPs?

How big are the orbits?

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Is there a pile-up?

How are the orbits oriented?

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How can we find misaligned CBPs?

What are the binaries like?

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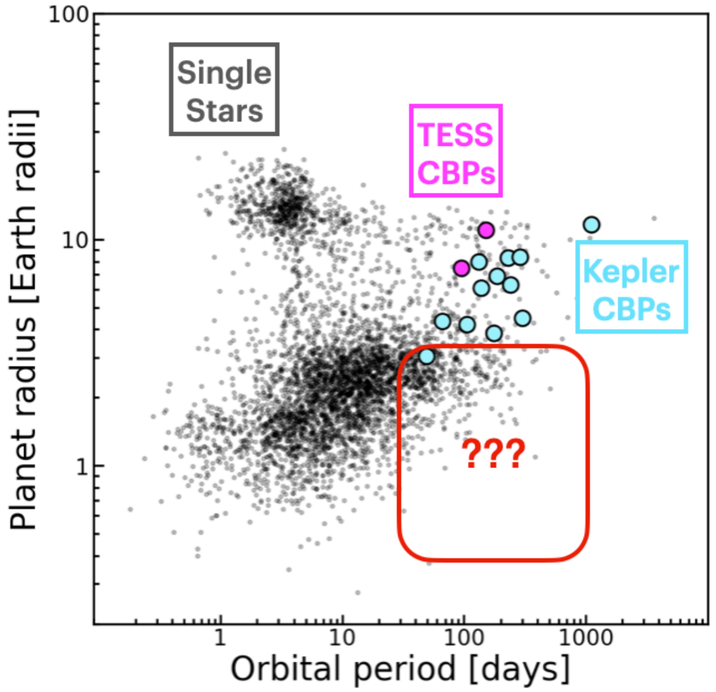
Where are the tight-binary planets?

Small CBPs?



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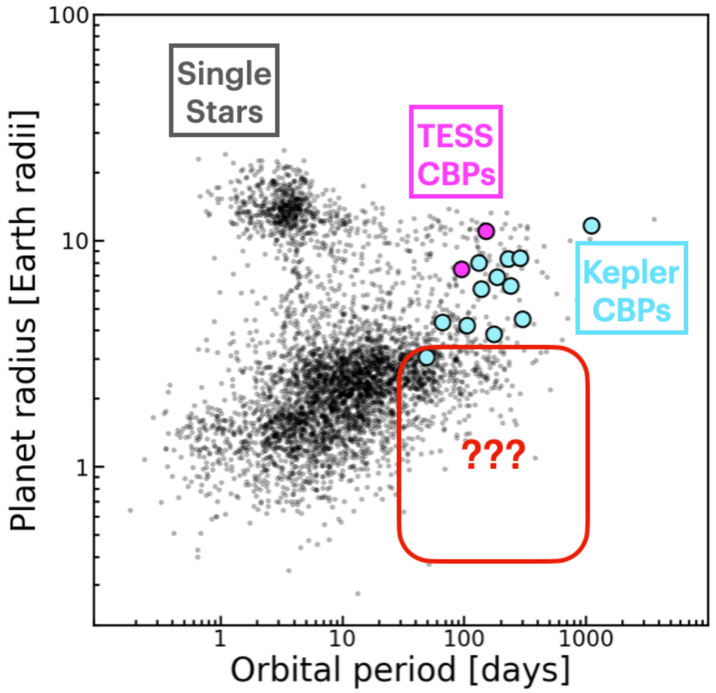
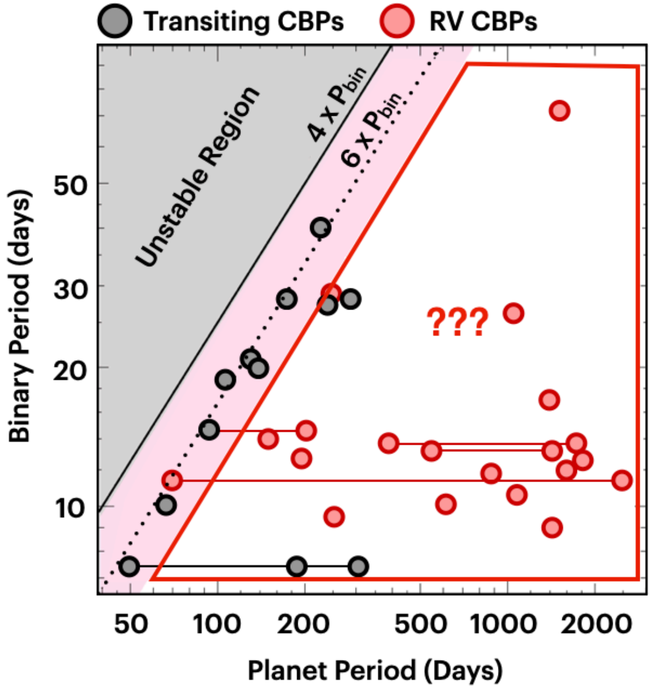


Pile-up?



How are the orbits oriented?

↓

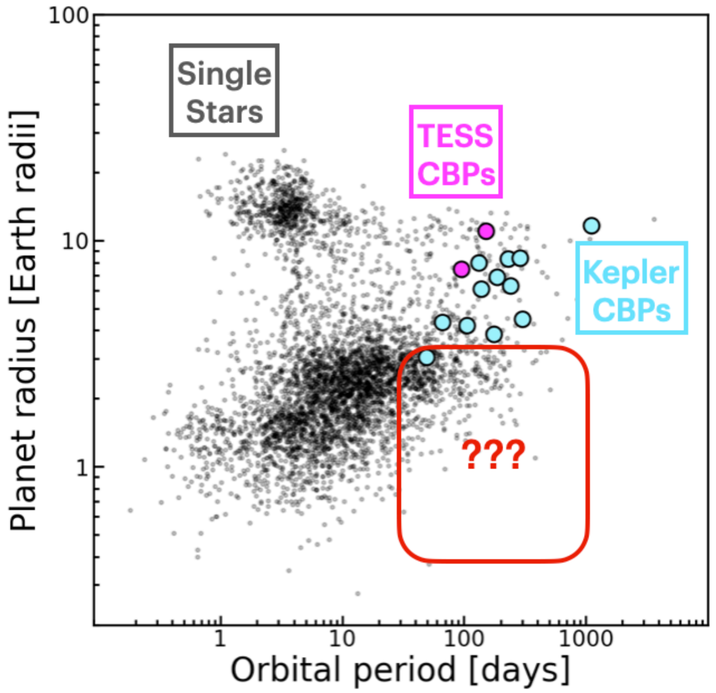
How can we find misaligned CBPs?

What are the binaries like?

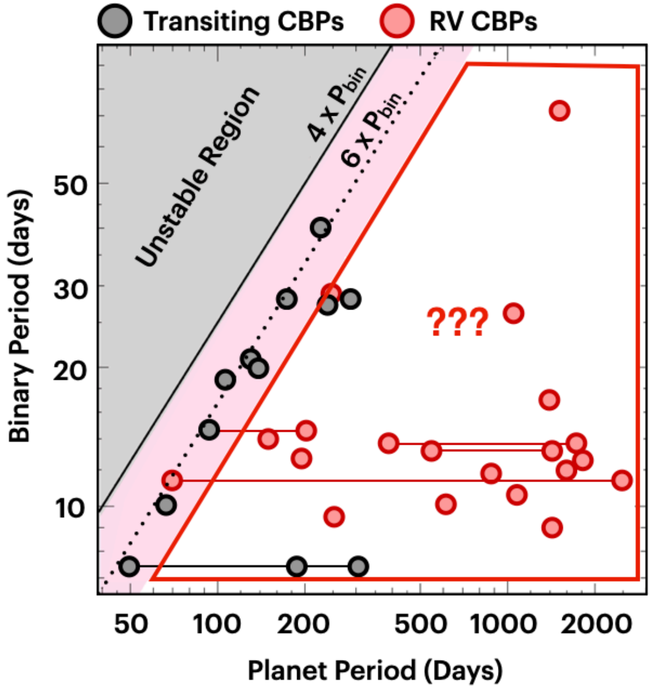
↓

Where are the tight-binary planets?

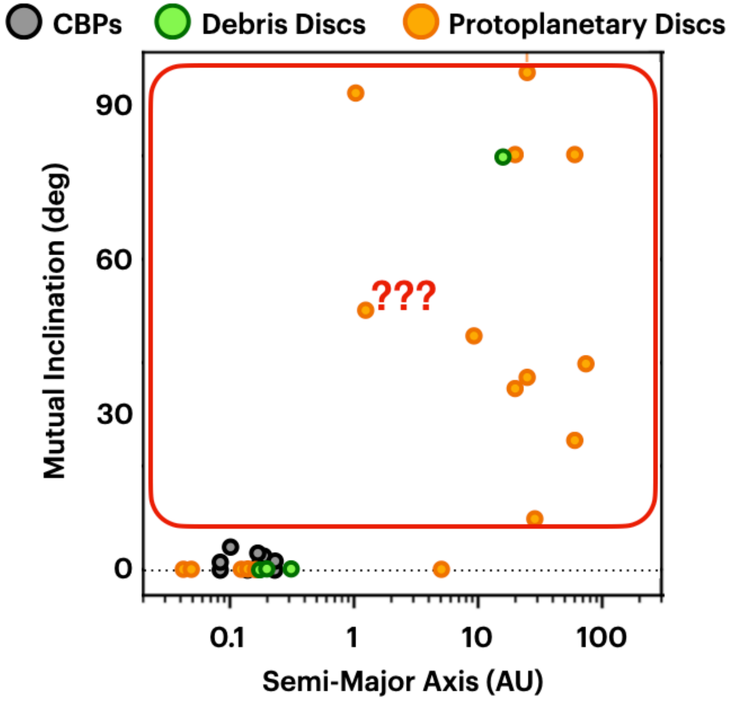
Small CBPs?



Pile-up?



Misaligned CBPs?

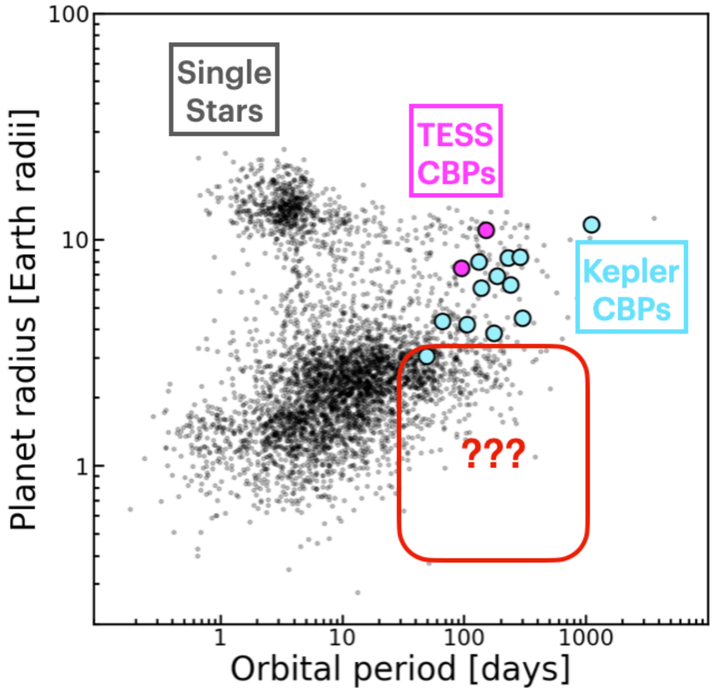


What are the binaries like?

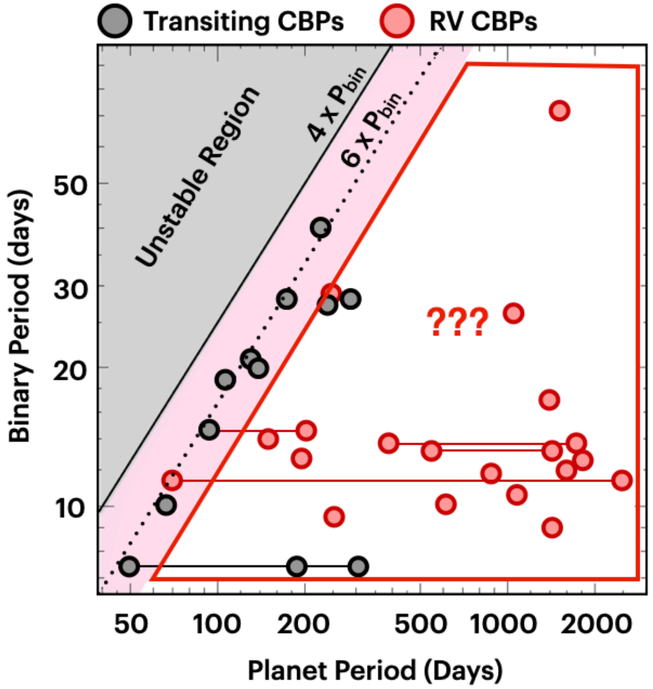
↓

Where are the tight-binary planets?

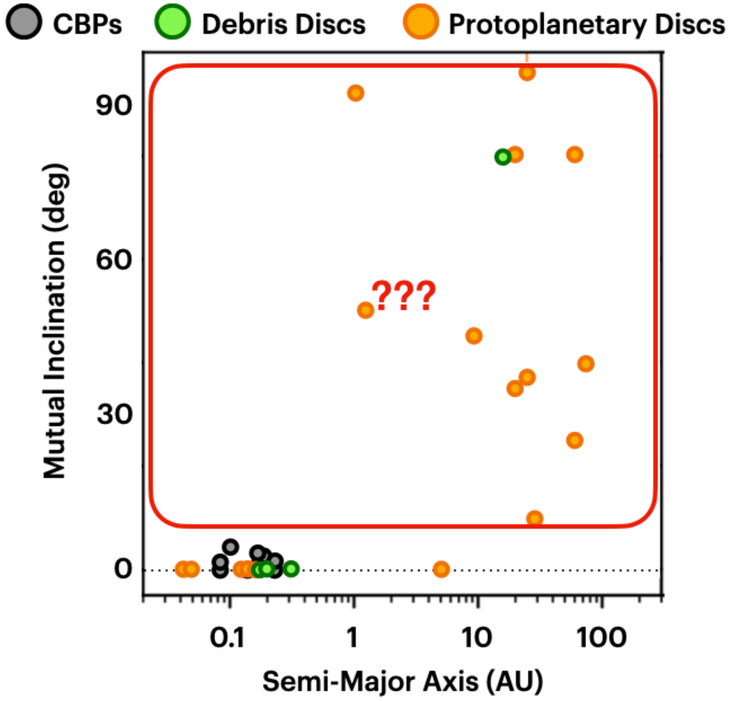
Small CBPs?



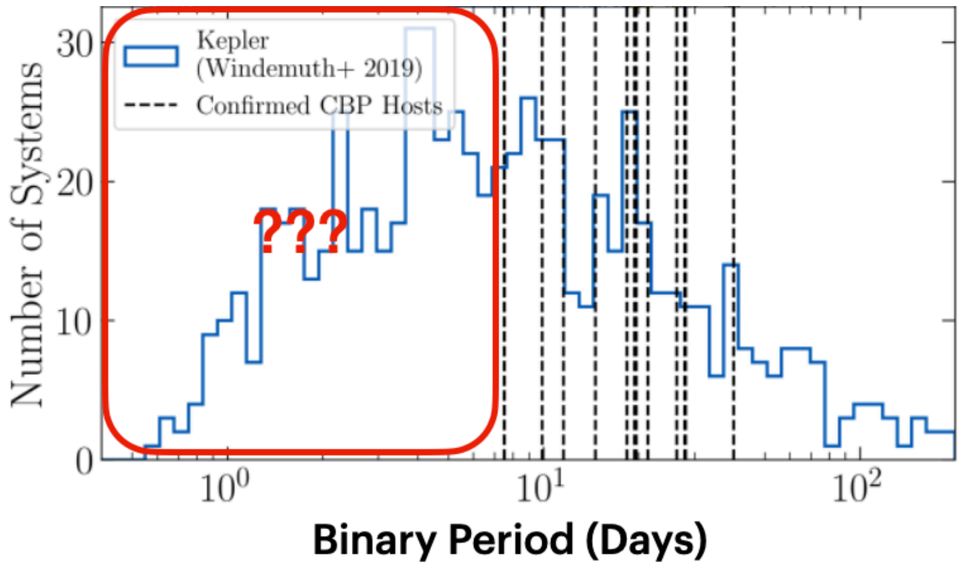
Pile-up?



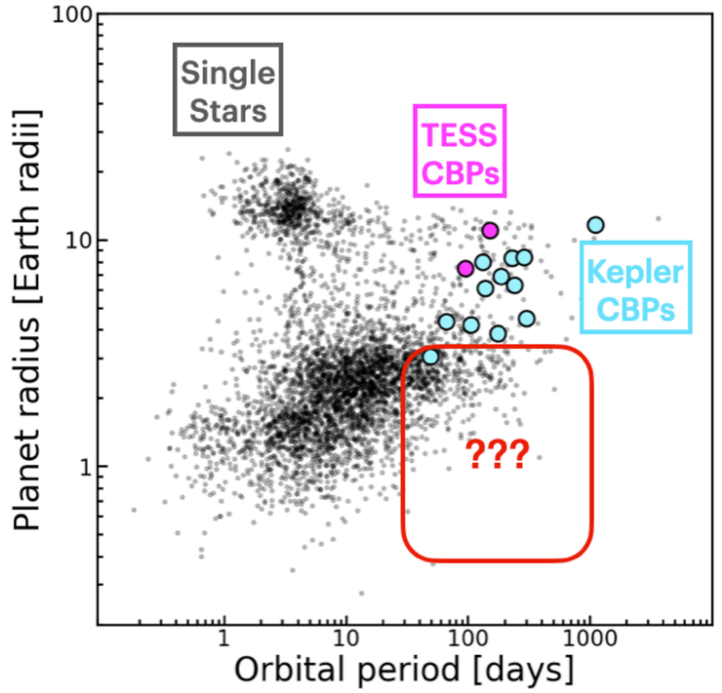
Misaligned CBPs?



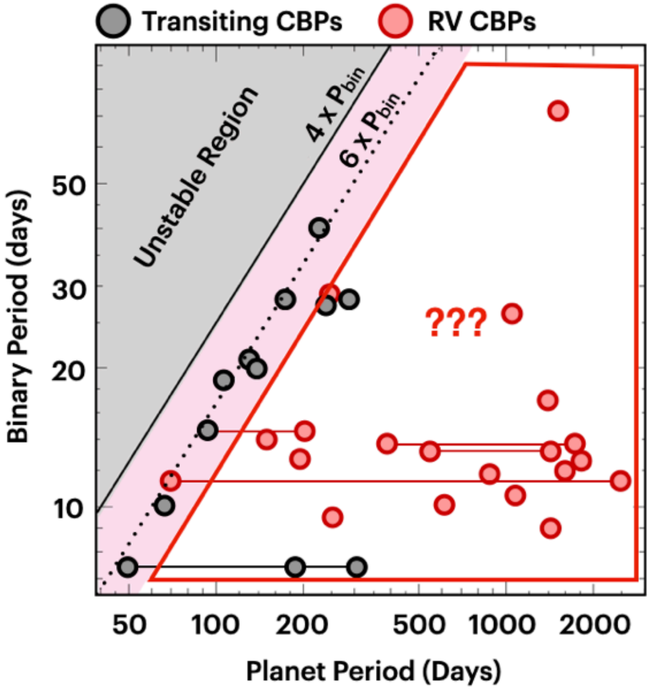
Tight binary CBPs?



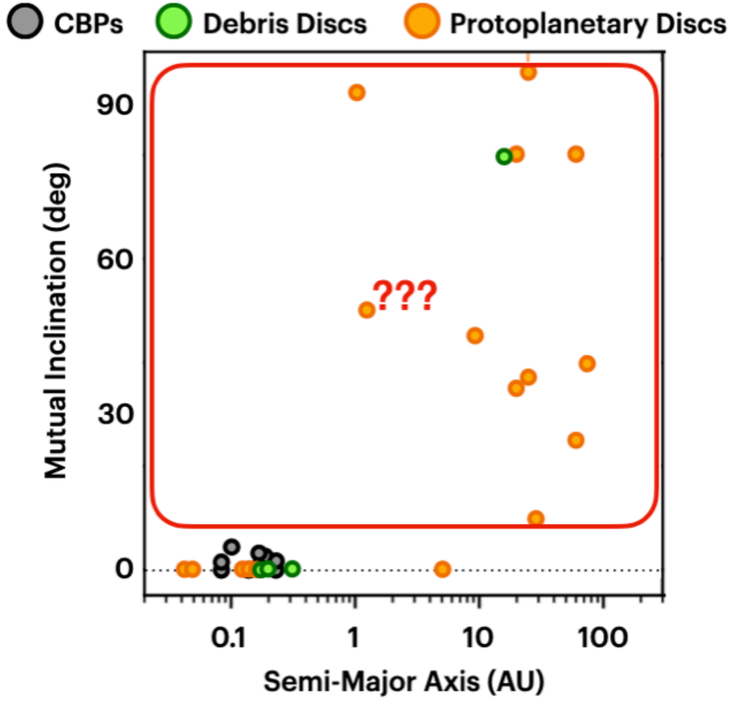
Small CBPs?



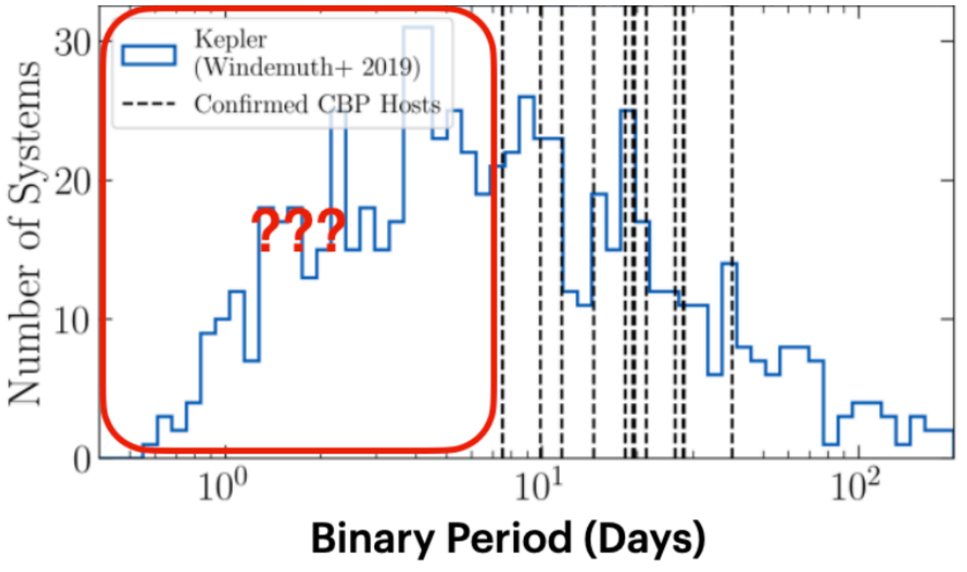
Pile-up?



Misaligned CBPs?

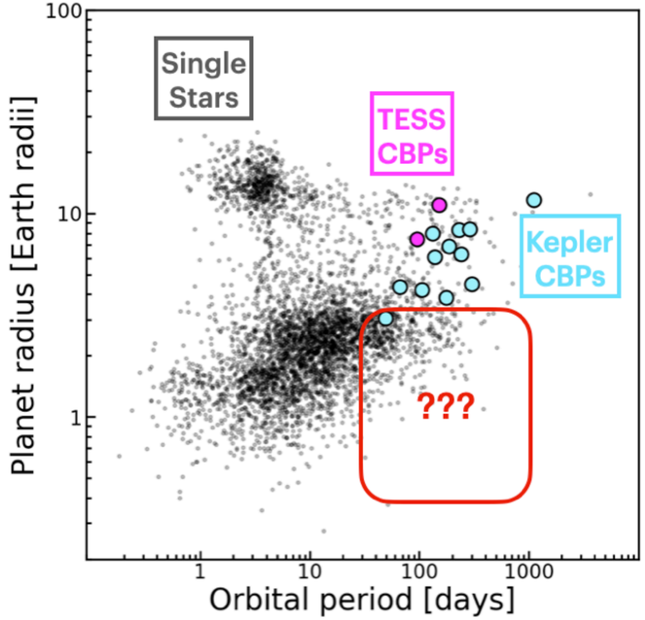


Tight binary CBPs?

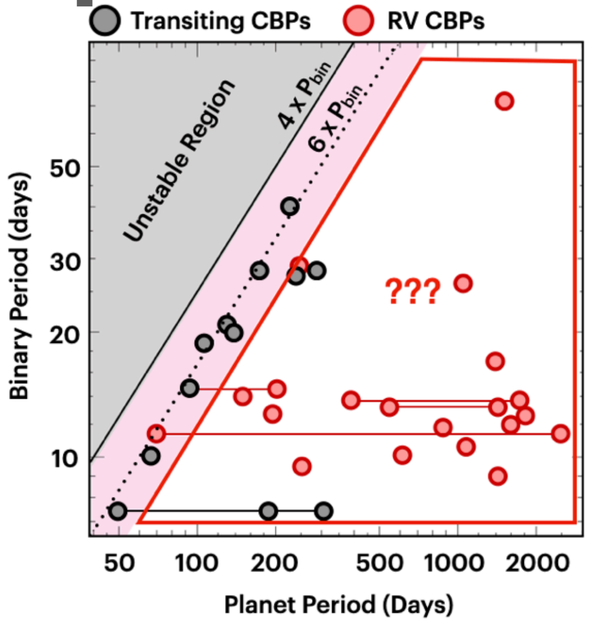


The known (and unknown) population of CBPs

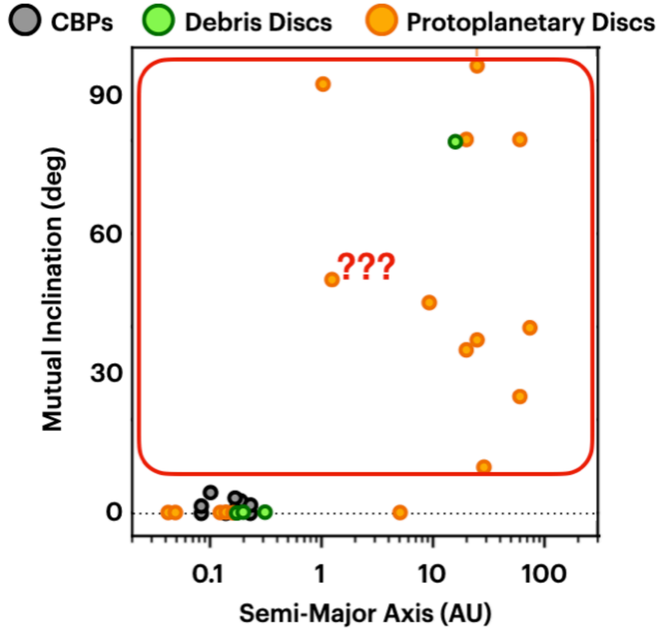
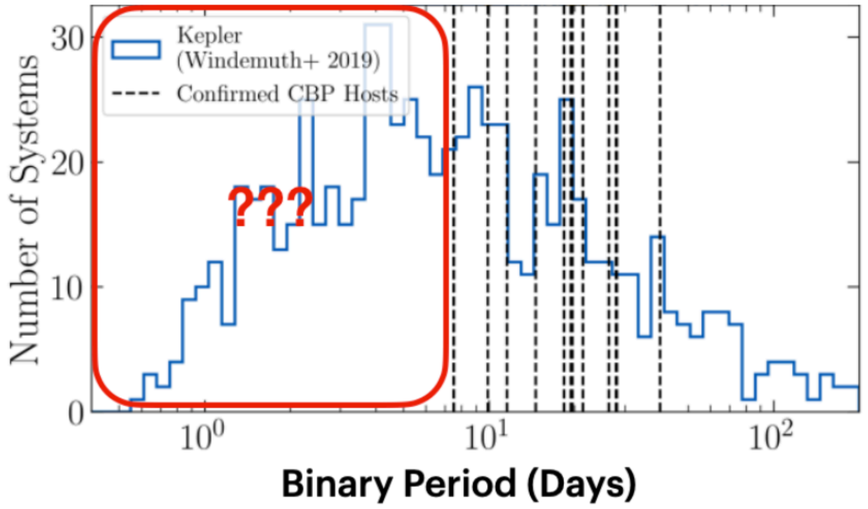
Small CBPs?



Pile-up?



Misaligned CBPs?



Tight binary CBPs?