Pushing down the limits

HD 156846
G1 V
Dist 47.6 pc

$P_1 = 359$ days
$e = 0.848$
$m \sin i = 11 \, M_{\text{Jup}}$

$O-C = 5.8 \, \text{m/s}$
185 observations
$O-C(\text{bin}) = 1.9 \, \text{m/s}$
20 bins

Nearly gaussian statistics when binning in True Anomaly
Pushing down the limits

HD 40307
K2 V
Dist 12.8 pc
[Fe/H] = -0.31

Nearly gaussian statistics when binning in True Anomaly

\[ P_1 = 4.31 \text{ days} \]
\[ m_1 \sin i = 4.3 \, M_{\oplus} \]

\[ P_2 = 9.62 \text{ days} \]
\[ m_2 \sin i = 6.9 \, M_{\oplus} \]

\[ P_3 = 20.5 \text{ days} \]
\[ m_3 \sin i = 9.7 \, M_{\oplus} \]

\[ O-C = 1.00 \, \text{m/s} \]
397 observations
\[ O-C(\text{bin}) = 18 \, \text{cm/s} \]
10 bins
Pushing down the limits

HD 85512
K6V
Dist 11.15 pc
[Fe/H] = -0.32

\( P_1 = 58.2 \text{ days} \)
\( m_1 \sin i = 3.6 \, M_\oplus \)

\( \text{O-C} = 1.00 \, \text{m/s} \)
\( \text{443 observations} \)
\( \text{O-C(bin)} = 15 \, \text{cm/s} \)
\( 10 \text{ bins} \)

nearly gaussian statistics when binning in True Anomaly
A 1.2 Mearth planet orbiting a nearby K dwarf

$K = 93 \pm 9 \text{ cm/s}$

$O-C = 1.00 \text{ m/s}$

$>400$ observations

$O-C(\text{bin}) = 15 \text{ cm/s}$

10 bins
Pushing down the limits

Nearby M dwarf

M2

\[ P_1 = 7.2 \text{ days} \]
\[ m_1 \sin i = 7 \, M_{\oplus} \]

\[ O-C = 1.75 \, \text{m/s} \]
179 observations
\[ O-C(\text{bin}) = 60 \, \text{cm/s} \]
20 bins

nearly gaussian statistics when binning in True Anomaly
NEAT Detection & characterization scenarios

- Take into account RV follow-up
- RV average in near gaussian stat down to 15cm/s
- # RV meas is important: typically 200-400 but could be up to 800.
- For smallest mass planets, at least 50-100 hours/target, but could be up to 200 hours/target