



Searching for Exoplanets Around Faint Stars in TESS FFIs



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Summary

Goal: To search for new exoplanets around faint stars using TESS Full-Frame Images (FFIs)

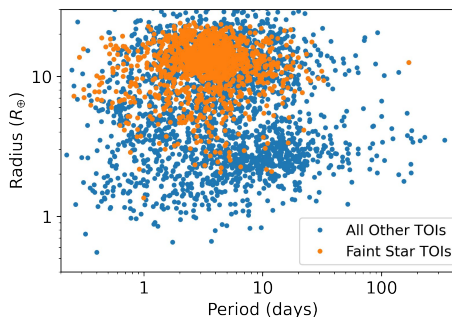
Motivation: MIT's Quick Look Pipeline (QLP) vets planets around stars brighter than TESS mag = 10.5 (1.5m stars), but produces FFI lightcurves for stars down to TESS mag = 13.5 (20m stars). Most TESS planets should orbit these fainter stars.

Main Findings: 1,600+ TOIs from the TESS Primary Mission - and counting

Methodology

- ❑ Use Box-Least Squares transit search results from QLP
- ❑ Initial triage with Astronet-Triage to identify transit-like features
- ❑ Automated vetting with decision-tree metrics to identify planet candidates
- ❑ Manual review of summary reports to identify final TOIs

Results

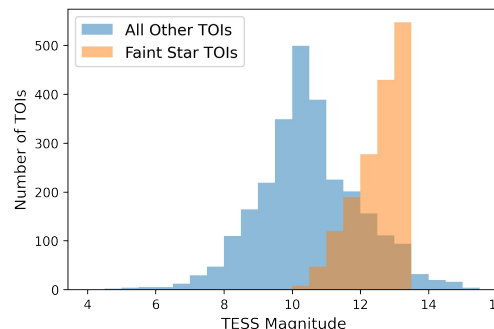


1,617 new TOIs detected in TESS Primary Mission QLP lightcurves, including:

- ❑ 41 small ($< 4 R_{\oplus}$) candidates
- ❑ 949 hot Jupiters

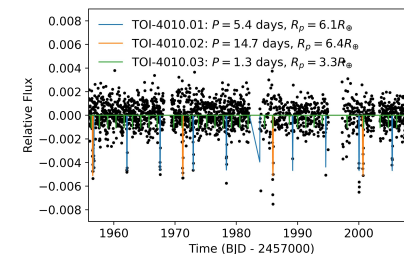
227 TOIs have dispositions, including:

- ❑ 3 known planets
- ❑ 46 nearby eclipsing binaries
- ❑ 136 validated on-target candidates

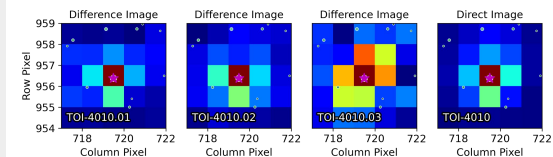


Highlight: TOI-4010

Three closely packed planet candidates orbiting K dwarf TIC-352682207



Difference images indicate all three are likely on target:



Next Steps

- ❑ Move on to the Extended Mission
- ❑ Make vetting pipeline fully automated
- ❑ Characterize completeness and false positive rate in preparation for demographics study