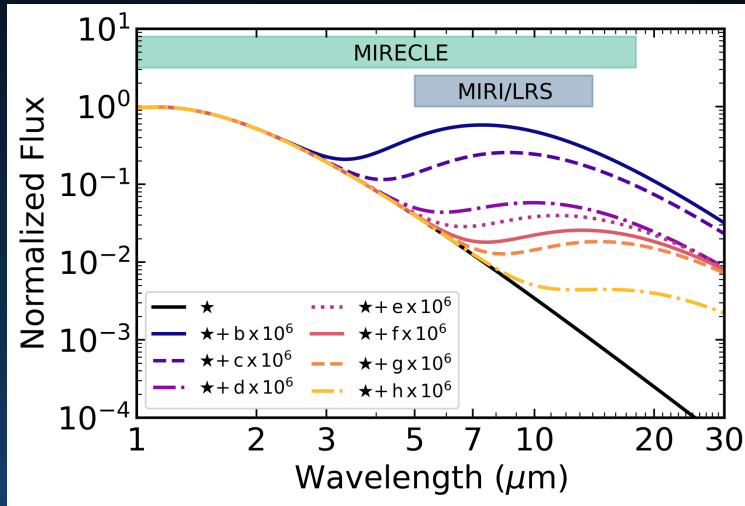


On the Effectiveness of PIE in Multi-Planet Systems: TRAPPIST-1

One proposed method to look for and characterize non-transiting planets is via the planetary infrared excess (PIE) technique, which takes inspiration from searches for disks around stars but instead of a disk we're detecting the flux from a planet.

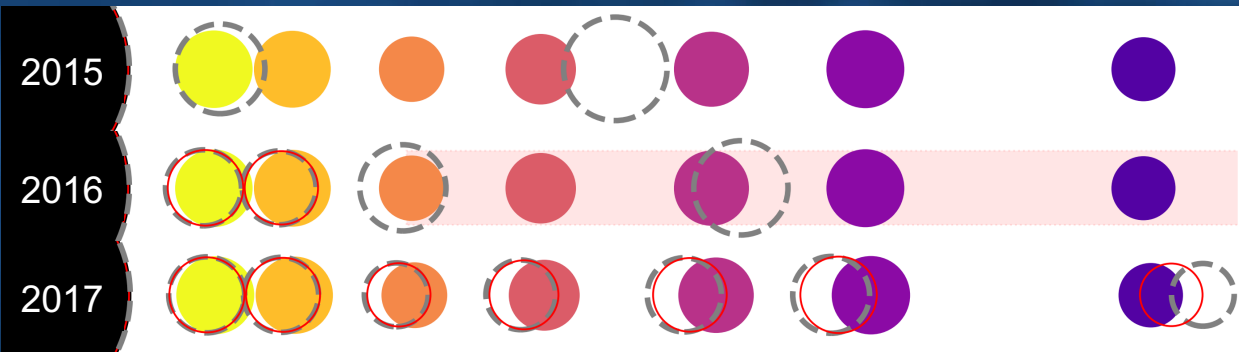


The majority of planets in the solar-neighborhood are inaccessible to JWST and HWO, due to either their non-transiting nature or separation from their host star. How will we discover and characterize our neighbors?

- Multi-planet systems present an additional complexity due to potential source confusion.
- We examined the information gained from a PIE analysis of the TRAPPIST-1 system as information was revealed through time.

Results:

- In non-transiting situations, PIE can determine planets are present and measure their equilibrium temperatures.
- In compact scenarios, semi-major axis constraints are critical.



The evolution of knowledge in the TRAPPIST-1 system. The colored circles indicate the true planet sizes and positions. Red circles and shading show published knowledge. Gray circles show inferences from PIE as to the number and properties of planets