



The Search for Jovian Exoplanets in the Solar Neighborhood

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Abstract

Since 1999, RECONS (www.recons.org, REsearch Consortium On Nearby Stars) has been using astrometric techniques to search for massive planets orbiting ~ 100 nearby stars. Unlike radial velocity searches, our astrometric effort is most sensitive to Jovian planets in Jovian orbits, i.e. those that span decades. To date, we have detected companion stars and brown dwarfs, as well as one enigmatic unseen companion that eludes direct detection, and are currently pushing into the realm of Jovian planets. As a result, we are now able to assess the population of companions orbiting the nearest stars.

Discussion

Because of their proximity, nearby stars are natural locations to search for other solar systems. The stars provide increased fluxes, larger astrometric perturbations, and higher probabilities for eventual resolution of planets than similar stars at larger distances. Examination of the nearby stellar sample will reveal the prevalence and structure of solar systems, as well as the balance of Jovian and terrestrial planets, and will ultimately be key in our search for life elsewhere.

Here we describe our astrometric measurements of ~ 100 red and white dwarfs for up to 12 years, at positional accuracies of a few milliarcseconds per night. We have discovered stellar companions with masses of a few hundred Jupiters, brown dwarf companions of a few tens of Jupiters, and can eliminate companions down to a few Jupiter masses for the nearest red dwarfs. We also report on our comprehensive sweep of the solar neighborhood [1, 2, 3, 4, 5] to identify the ~ 6000 stellar systems closest to the Sun — remarkably only about one-third of these systems have been confirmed via trigonometric parallaxes. Details of the sample of objects currently known within 10 parsecs are shown in Table 1.

Table 1: Census of Objects Nearer than Ten Parsecs

	2000.0	2011.0	
total objects	293	369	26% increase
systems	213	256	20% increase
companions	80	113	41% increase
singles	151	174	
doubles	48	60	
triples	11	16	
quadruples	2	3	
quintuples	1	3	
WDs	18	20	white dwarfs
Os	0	0	
Bs	0	0	
As	4	4	
Fs	6	6	
Gs	20	20	
Ks	44	44	
Ms	198	247	red dwarfs
Ls	0	4	
Ts	1	9	
Ps	2	15	exoplanets

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