



# SPECKLE INTERFEROMETRIC SURVEY OF STARS OF THE TYPE II POPULATION WITH THE 6-METER TELESCOPE

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## Abstract.

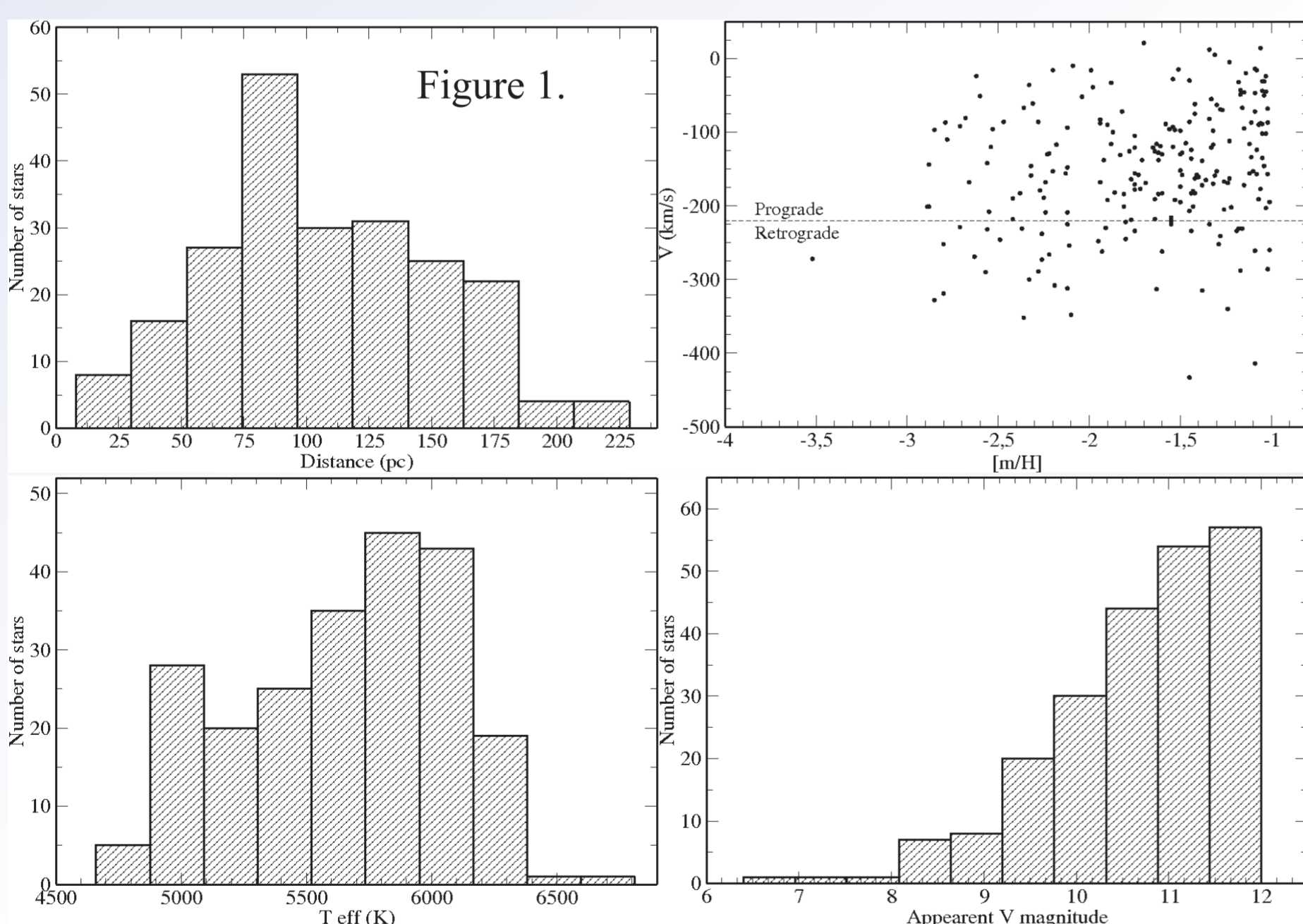
*Results of the speckle interferometric survey of 109 stars with large proper motion and the metallicity  $[m/H] < -1$  fulfilled with the 6-meter telescope in the Northern Hemisphere are presented. 8 objects were resolved. 7 of them were resolved for the first time. 5 new systems were discovered: 2 binary systems, 2 triple systems and one quadrupole system. Taking into account known spectral pairs and wide components with common proper motion, the ratio of single, binary, triple and quadrupole systems among the studied stars is equal to 71:29:6:1.*

**Introduction.** The study of multiplicity of stars of the type II population is mainly based on the analysis of spectra of these stars (Goldberg et al. 2002; Latham et al. 2002) with involvement of data on visual binary systems and pairs with common proper motion (Allen et al. 2000; Zapatero Osorio & Martin 2004). It is evident that distributions of semi-major axes and orbital periods for systems studied by different methods do not intersect. At present, information on multiplicity of old stars in the "intermediate" range of semi-major axes accessible for observation with the help of adaptive optics and interferometric methods (Zinnecker et al. 2004) is still insufficient. To enlarge the data base of multiplicity of stars of the halo and thick disk and to determine properties of their components we started speckle interferometric observations of objects close to the Sun with low metallicity and large proper motion. This poster presents results of speckle interferometric observations of 109 stars of the halo and thick disk fulfilled in the period from April to December 2006.

**Sample.** Stars for our program were selected from the catalog Carney et al. 1994 (CLLA) which is a subsample of the catalog of stars with large proper motion (*Lowell Proper Motion Catalog*; Giclas et al. 1971, 1978). We selected 223 stars from CLLA by the following criteria:

- 1) Metallicity  $[m/H] < -1$ ,
- 2) Declination  $> -10^\circ$ ,
- 3) Visual magnitude  $m_V < 12^m$ .

Some basic characteristics of the sample are adduced in Fig.1.



**Observations and results.** From April to December 2006 we carried out speckle interferometric observation of 109 from 233 stars of the sample with the 6-meter telescope BTA. In all, 8 objects were resolved: G102-20, G191-55, BD +19 1185A, G89-14, G87-45, G87-47, G111-38, G114-25. 7 of them were resolved astrometrically for the first time. 5 new objects were discovered: two binary systems (G191-55, G114-25), two triple systems (G111-38, G87-47) and one quadrupole system (G89-14). All resolved stars are adduced in Table 1.

Table 1. Resolved stars

Name	$m_V$	$[m/H]$	$\rho$ (")	$\Delta m$	Filter	Total multiplicity
G102-20	10.22	-1.17	0.120±0.006	3.24±0.11	550/20	2
G191-55	10.47	-1.94	0.814±0.002	2.00±0.01	800/100	2
BD +19 1185A	9.32	-1.47	0.115±0.001	1.77±0.02	550/20	3
G89-14	10.40	-1.90	0.989±0.005	4.14±0.06	800/100	4
G87-45	11.44	-1.49	0.285±0.002	2.01±0.04	550/20	3
G87-45	11.44	-1.49	0.285±0.002	1.76±0.02	800/100	3
G87-47	10.34	-1.34	0.078±0.003	1.74±0.03	800/100	3
G111-38AB	8.7	-1.04	0.084±0.001	0.78±0.01	550/20	3
G111-38AB	8.7	-1.04	0.084±0.001	0.75±0.01	800/100	3
G111-38AC	8.7	-1.04	2.133±0.005	1.34±0.01	550/20	3
G111-38AC	8.7	-1.04	2.133±0.005	1.09±0.01	800/100	3
G111-38BC	8.7	-1.04	2.216±0.005	0.57±0.01	550/20	3
G111-38BC	8.7	-1.04	2.216±0.005	0.34±0.01	800/100	3
G114-25	11.92	-2.28	0.781±0.005	3.83±0.16	800/100	2

**Multiplicity of stars.** To count the total amount of multiple systems we supplemented available information on spectral multiplicity of all 109 stars and obtained results by data of wide components from the catalog WDS (Mason et al. 2001). We selected 13 from 43 companions found in WDS. The others were rejected as optical pairs. The resulting ratio of single, binary, triple and quadrupole systems detectable by all methods for observed stars is equal to 71:29:6:1.



Figure 2. The autocorrelation function of the new triple system G111-38.

**Conclusions.** Comparison of the obtained ratio of multiple stars of the sample with the analogous value of 51:40:7:2 obtained for the nearest G dwarfs (Duquennoy & Mayor 1991) shows that there is a deficit of old binary stars. Since there is no special difference between the number of binary systems with a small period ( $P < \sim 10$  years) among halo stars and disk stars (Latham et al. 2002), such a deficit can be explained by the decay of wide pairs due to dynamical evolution (Allen et al. 2000) or by difference of criteria when compiling the compared samples. Unlike our sample, the sample in the paper of Duquennoy & Mayor 1991 is limited in distance by 22 pc from the Sun. Thus, our sample has more unaccounted systems detectable by different methods, which is a stimulus for further investigations.

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