

Table of Contents

ABSTRACT.....	I
TABLE OF CONTENTS	III
Chapter 1 The Solar Neighborhood: Still Under Development	1
1.1 INTRODUCTION	1
1.2 ROLE OF NEARBY STAR SAMPLES	3
1.3 DEFINING NEARBY STARS.....	7
1.4 DEVELOPMENT OF THE NEARBY STAR SAMPLES.....	12
1.4.1 <i>Five-parsec Sample</i>	13
1.4.2 <i>Ten-parsec Sample</i>	20
1.4.3 <i>Twenty-parsec Sample</i>	20
1.4.4 <i>Twenty-five-parsec Sample</i>	21
1.5 NEW AND COOL MEMBERS OF THE SOLAR NEIGHBORHOOD	22
1.5.1 <i>M, L, and T Dwarfs</i>	22
1.5.2 <i>Low-mass Companions</i>	24
1.6 FUTURE OF THE NEARBY STAR SAMPLE.....	26
Chapter 2 Barnard's Star: Parallax, Proper Motion, And Possible Planetary Perturbation	28
2.1 INTRODUCTION	28
2.2 HISTORY	30
2.2.1 <i>Astrometric Studies</i>	30
2.2.2 <i>Radial-Velocity Studies</i>	34
2.2.3 <i>Direct Imaging Studies</i>	35
2.2.4 <i>Miscellaneous Studies</i>	37
2.3 MEASUREMENT AND ANALYSIS.....	38
2.3.1 <i>Relative Motions</i>	39
2.3.2 <i>Reduction to Absolute</i>	43
2.3.3 <i>Time-Series Analysis</i>	62
2.3.4 <i>Companion Mass Limits</i>	76
2.4 DISCUSSION.....	85
Chapter 3 Planets In The South: Astrometric Search For Companions To Stars On The University Of Virginia Southern Parallax Program.....	87
3.1 INTRODUCTION	87
3.2 MEASUREMENT AND ANALYSIS.....	88
3.2.1 <i>Concerns Regarding Time and Parallax Factor Calculations</i>	98
3.2.2 <i>Periodograms</i>	102
3.2.2.1 LHS 34	103
3.2.2.2 LHS 271	108
3.2.2.3 LHS 288	112
3.2.2.4 LHS 337	125
3.2.2.5 LHS 532	129
3.2.2.6 LHS 1134	133
3.2.2.7 LHS 1565	137
3.2.2.8 LHS 2310	141
3.2.2.9 LHS 2739	145
3.2.2.10 LHS 2813	149

3.2.2.11	LHS 3064	154
3.2.2.12	LHS 3242	159
3.2.2.13	LHS 3418	163
3.2.3	<i>Companion Mass Limits</i>	167
3.2.3.1	Limits for the Sample Generally	172
3.2.3.2	Limits for LHS 288	174
3.3	DISCUSSION.....	177
Chapter 4 Solar Neighborhood Census: Identifying and Characterizing New Nearby Stars... 178		
4.1	INTRODUCTION	178
4.2	SELECTION.....	181
4.2.1	<i>Possible Nearby Stars</i>	181
4.2.2	<i>Probable Nearby Stars</i>	184
4.3	ASTROMETRY	206
4.3.1	<i>Stars with Preliminary Absolute Parallaxes</i>	217
4.3.1.1	2MA 0517-3349	222
4.3.1.2	LHS 6167	222
4.3.1.3	BD -10°3166.....	222
4.3.1.4	LHS 2880	223
4.3.1.5	2MA 1534-1418	223
4.3.1.6	LP 876-10.....	224
4.3.2	<i>Stars with Preliminary Relative Parallaxes</i>	224
4.3.2.1	LP 991-84.....	224
4.3.2.2	LHS 1363	225
4.3.2.3	2MA 0251-0352	225
4.3.2.4	2MA 0921-2104	225
4.3.2.5	LP 932-83	225
4.3.2.6	2MA 2306-0502	226
4.3.3	<i>Dropped Stars</i>	226
4.4	PHOTOMETRY	228
4.5	SPECTROSCOPY	239
4.5.1	<i>LP 655-43</i>	244
4.5.2	<i>LP 716-10</i>	244
4.5.3	<i>LHS 2024</i>	244
4.5.4	<i>LP 671-8</i>	245
4.5.5	<i>2MA 1155-3727</i>	245
4.5.6	<i>LP 734-34</i>	246
4.5.7	<i>LP 615-149</i>	246
4.5.8	<i>LHS 5226</i>	247
4.5.9	<i>CE 303</i>	247
4.5.10	<i>2MA 2351-2537</i>	247
4.5.11	<i>LP 704-15</i>	248
4.6	MULTIPLICITY	248
4.6.1	<i>2MA 0429-3123AB</i>	249
4.6.2	<i>LP 731-76 and BD -10°3166</i>	250
4.6.3	<i>LHS 2397aAB</i>	253
4.6.4	<i>LHS 2783AB</i>	254
4.6.5	<i>LP 869-26AB</i>	255
4.6.6	<i>LP 984-92 and LP 984-91</i>	257
4.6.7	<i>LP 932-83 and LTT 9210</i>	258
4.6.8	<i>LP 704-15 and LP 704-14</i>	259
4.6.9	<i>Distance Discrepancies</i>	260
4.7	DISCUSSION.....	261

Chapter 5	Continuing The Solar Neighborhood Census: Infrared Parallax Program At Fan Mountain Observatory	265
5.1	INTRODUCTION	265
5.2	FAN MOUNTAIN 31-INCH TELESCOPE	267
5.3	ASTROMETRIC CALIBRATION REGION	270
5.4	OBSERVATIONS AND ANALYSIS.....	278
5.5	DISCUSSION.....	286
Chapter 6	Further Development of the Solar Neighborhood.....	288
6.1	INTRODUCTION	288
6.2	BARNARD'S STAR	288
6.3	SOUTHERN PARALLAX PROGRAM	289
6.4	CTIOPI	290
6.5	FAN MOUNTAIN OBSERVATORY	291
6.6	DISCUSSION.....	292
	ACKNOWLEDGEMENTS	294
	REFERENCES	299
	APPENDIX A. FINDING CHARTS FOR POSSIBLE NEARBY STARS	316