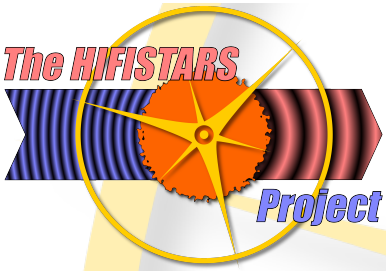

Herschel HIFISTARS Key Programme
USER PROVIDED DATA PRODUCTS RELEASE

Introduction

This document briefly describes the delivery to the Herschel Science Center (HSC), of the User Provided Data Products (UPDPs) of the Herschel Guaranteed Time Key Programme "HIFISTARS: The physical and chemical properties of circumstellar environments around evolved stars", P.I: V. Bujarrabal (KPGT_vbujarra_1, HIFISTARS hereafter). These data also include products from associated observations in the calibration and science demonstration (SDP) phases (projects Calibration_pvhifi_28 and SDP_vbujarra_3 respectively).

HIFISTARS is devoted to the study of the warm gas and water vapor contents of the molecular envelopes around evolved stars: AGB stars, red super- and hyper-giants (RSGs and RHGs); and their descendants, the pre-planetary nebulae (pPNe), planetary nebulae (PNe), and yellow hyper-giants (YHGs). This study has been done by means of the observation of rotational lines of several molecules sensitive to different properties and excitation conditions of these circumstellar envelopes.

The main target lines of the HIFISTARS project are the J=6–5, 10–9, and 16–15 transitions of ^{12}CO and ^{13}CO, and several lines of ortho– and para–H_2O sampling a large range of oscillator strengths and excitation energies, including vibrationally excited states. In addition, some other lines are observed simultaneously, thanks to the large instantaneous bandwidth of the HIFI detection system.

The strategy followed in HIFISTARS project is twofold. On the one hand, a small number of representative sources (IRC+10011, IK Tau, VY CMa, IRC+10216, W Hya, and chi Cyg) have been observed in a large set of observing setups (14 to 17) sampling more than 35 transitions of CO and H_2O and their rarer isotopomers, also including several lines of species such as HCN, CN, SiO, OH, SiS, CS, SO, SO_2, and NH_3. On the other hand, a larger number of sources (32) have been observed in a smaller number of frequency setups (typically between 6 and 9 setups). In this way, we can use the better studied sources in the former group as templates for the latter ones, helping in the understanding of chemical and physical properties of these envelopes as a function of the mass loss, chemical composition, and degree of evolution (see Table 1).

The data from the HIFISTARS programme have been obtained with the Herschel Space Observatory (see Pilbratt et al., 2010), using the Heterodyne Instrument for the Far Infrared, HIFI (see de Graauw et al., 2010). In total we have observed up to 19 different frequency settings, using the bands 1B, 2A, 2B, 4A, 4B, 5A, 6B, 7A and 7B of the HIFI instrument, in a total of 38 sources. However, as it has been explained above, we have not observed every source in every setting. See Table 1 for the settings in which each source has been observed. In Table 2 we quote the telescope characteristics adopted for each setting, and the main spectral lines covered by the

instrument. HIFISTARS comprises 366 successfully (at least partially) observations, totaling 11,186 min. of telescope time (more than 186 hours). The list of HIFISTARS observations, sorted by OBSID, can bee seen in Table 3. Some sources have been observed twice in some settings, due to partial failures. This was due to a sporadic bad performance of the instrument in our setting 03b (because of LO malfunctioning due to low input power levels). In other cases, the setup was repeated with a small frequency shift to help in the side band separation of the detected lines.

More documentation on the HIFISTARS project can be found in its official web pages at `http://hifistars.oan.es`, and in the papers published by the team, such as Bujarrabal et al. (2012), Teyssier at al. (2012), Justtanont et al. (2012), and Neufeld et al. (2011).

The HIFISTARS observational procedure

The observations have been always performed using the two orthogonal linearly polarized receivers available at each band, named H and V after their horizontal and vertical orientations. These receivers work in double side band mode (DSB), which doubles the instantaneous sky frequency coverage of the HIFI instrument: 4 plus 4 GHz for the SiS receivers of bands 1 to 5, and 2.3 plus 2.3 GHz for the HEB receivers of bands 6 and 7. During the design phase of the HIFISTARS program, the LO frequencies for the different setups were carefully chosen to avoid overlapping between strong lines entering from the lower and upper side bands (LSB and USB respectively). At the same time, these LO frequencies were chosen so as to maximize the number of potentially interesting lines within the instantaneous band coverage, and the receiver performance. (For some tunings, the performance of the receiver varies across the band. In these cases we tried lo locate our main target lines in the best IF frequencies.)

The observations have been always performed in the dual beam switching (DBS) mode. In this mode, the HIFI internal steering mirror chops between the source position and an (expected) emission-free position located 3 arc-min away from the science target. In the DBS mode the telescope alternatively locates the source in either of the two chopped beams, providing a double-difference calibration scheme, (ON_a-OFF_b) – (OFF_a,–ON_b), which allows a more efficient cancellation of the residual baseline and optical standing waves in the spectra (see Roelfsema et al., 2012, for further details). In our program, DBS procedure worked well except for HEB receivers in bands 6 and 7, where strong electronic ripples were often found in the averaged spectra, especially in the case of the V-receiver. We always pointed the telescope to the best known position of the central star, knowing that in some cases the envelopes are larger than the beam of the telescope.

The HIFI data described here were taken using the wide-band spectrometer (WBS), an acusto-optical spectrometer that provides simultaneous coverage of the full instantaneous IF band in the two available orthogonal receivers. WBS has an effective spectral resolution slightly varying across the band, with a mean value of 1.1 MHz. This spectrometer is made of units with bandwidths slightly larger than 1 GHz, and therefore four/three units per receiver are needed to cover the full band for bands 1 to 5, and 6 and 7 respectively. The high resolution spectrometers (HRSs) were also connected in the observations but the results from these units are not provided in this release.

The data reduction scheme

For this release, data has been downloaded from the Herschel Science Archive (HSA), and then re-processed using a modified version of the standard HIFI pipeline using HIPE[1] (SPG version 6.1.0 or later, except for a two exceptions, see Table 3). This customized level-2 pipeline provides, as final result, DBS (ON_a-OFF_b) – (OFF_a,–ON_b) double difference elementary integrations without performing the final sub-scan time-averaging, but stitching the 4 or 3 used sub-bands together[2]. These spectra are exported to CLASS[3] using the hiClass tool within HIPE, for further inspection and flagging out of data with outstanding ripple residuals or other problems. Due to CLASS needs, in this step the data are re-sampled into an uniform spectral resolution of 0.5 MHz. hiClass task exports HIFI data in a FITS format suitable for CLASS assuming that the source is at rest w.r.t. the Local Standard of Rest (V_{LSR} is set to zero). This procedure has been done automatically, except for some cases in which in addition we have corrected some corrupted data frames using HIPE scripts provided by the HSC.

Using CLASS scripts we have made plots of the individual sub-scans of every observation as well as of a quick integration. These plots have been inspected looking for individual bad sub-scans, spurs and other problems. In general, the data presented no problems and did not need a lot of flagging out, except for the frequency settings observed using bands 6 and 7, for which we had to discard about 45% of the sub-scans to eliminate ripples well above the thermal noise level. In the case of the ripples of the HEB receivers, this data flagging has been done using a semi-automated script that efficiently identifies the sub-scans in which these ripples were more prominent, which results in a final spectra with less integration time but with a more reliable baseline, since the standing waves are largely suppressed. Some instrumental features affecting the baseline were also detected in settings 09, 10, and 11, which were also largely suppressed by removing the worst sub-scans after careful individual sub-scan visualization. We also note that in these latter cases, these instrumental features are smooth and much broader than the observed spectral lines, and therefore can be safely eliminated by a careful baseline subtraction.

Finally, the data have been re-calibrated into (Rayleigh-Jeans equivalent) main-beam temperatures T_{MB} adopting the latest available values for the telescope and main beam efficiencies (see Table 2 and Roelfsema et al., 2012). In all cases we assumed a side-band gain ratio of one. A summary of these telescope characteristics, including the total observational uncertainty budget, are given in Table 2. We have also subtracted a linear baseline, after masking the strong lines identified in the spectrum. The final data has been saved in CLASS format using both LSB and USB frequency scales.

For each individual observation, that can be identified by its unique Herschel OBSID number, we provide a single CLASS file containing two spectra (LSB and USB frequency units). We stress that we do not provide single side band de-convolved

1 HIPE is a joint development by the Herschel Science Ground Segment Consortium, consisting of ESA, the NASA Herschel Science Center, and the HIFI, PACS, and SPIRE consortia.

2 The standard HIPE pipeline does perform this total-average, providing just a single spectrum per receiver and WBS unit, but it does not do the sub-band stitching.

3 CLASS is part of the GILDAS software package, developed and maintained by IRAM, LAOG/Univ. de Grenoble, LAB/Obs. de Bordeaux, and LERMA/Obs. de Paris. See “http://www.iram.fr/IRAMFR/GILDAS” for further details.

spectra. Therefore both LSB and USB data (which in fact are the same data but as a function of the two possible frequency scales) can contain line features coming from both sidebands. This CLASS-format file is named **`1342nnnnnn-final.hifi`**, were **`1342nnnnnn`** is the 10-digit Herschel OBSID of the observation. To ensure the traceability of the data, the NUMBER parameter in the CLASS spectra is **`nnnnnn`** (i.e. the last 6 digits of the original OBSID) for both LSB and USB data, so CLASS command **`FIND /ALL`** must be used in order to find these two spectra. CLASS parameter LINENAME must be look at to find out about the sideband frequency scale of the data, as this parameter reads **`ffff.fff_LSB`** or **`ffff.fff_USB`**, where **`ffff.fff`** is the frequency of the LO in the observation in GHz.

These final data are also provided in FITS-VO-Compatible format, in two files named **`1342nnnnnn-final-LSB.new.fits`** and **`1342nnnnnn-final-USB.new.fits`** for the LSB and USB scales respectively. To ensure traceability of the data, the original OBSID is also given in the OBS_ID parameter of the FITS files, and the sideband is given in the META6 parameter (LINE for linename) using the same nomenclature as before (i.e. **`ffff.fff_LSB`** and **`ffff.fff_USB`**). These FITS files have been written importing the final data into HIPE format and then using the task SimpleFitsWriter in HIPE. Additional formats (two column ASCII files, FITS-CLASS-compatible) and additional information (list of bad sub-scans, non averaged files in various formats) will be accessible thought the web portal of the project (**http://hifistars.oan.es**).

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Acknowledgments

This program is partially supported by:

Spanish MICINN grant CONSOLIDER INGENIO 2010 “Astromol (CSD2009-00038)”
Spanish MCyT grants ESP 2002-01693 and ESP 2003-04957
Spanish MICINN grant AYA 2009-07304
Polish MNiSW grant N 203 58 1040 and NCN grant 2011/01/B/ST9/02229
Swedish National Space Board

APENDIX. Tables

Target name	R.A.(h:m:s) J2000	Dec.(d:m:s)	Setting number in table 2																			Σ
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
IRC+10011	1:06:25.98	+12:35:53.0	❶		❶	❶	❶	❶	❶	❶	❶	❶	❶	❶	❶	❶		❶	❶			15
omi Cet	2:19:20.79	-2:58:39.5			❷		❶	❶	❶	❶				❶		❶		❶	❶			10
V384 Per	3:26:29.53	+47:31:50.2							❶							❷			❶			4
IK Tau	3:53:28.84	+11:24:22.6	❶		❶	❶	❶	❶	❶	❶	❶	❶	❶	❶	❶	❶		❷	❶	❶	❶	18
R Dor	4:36:45.59	-62:04:37.8			❷		❶	❶	❶	❶				❶		❶		❶	❶			10
CRL 618	4:42:53.64	+36:06:53.4		❶	❶		❶	❶	❶					❶		❷		❷	❶			11
TX Cam	5:00:50.39	+56:10:52.6			❶		❶	❶	❶	❶				❶		❶		❶	❶			9
Betelgeuse	5:55:10.31	+7:24:25.4		❶	❶		❶	❶	❶					❶		❶		❶	❶			9
Red Rectangle	6:19:58.22	-10:38:14.7			❶			❶	❶					❶		❶		❶	❶			7
BM Gem	7:20:59.01	+24:59:58.1						❶	❶					❶	❶	❶			❶			6
VY CMa	7:22:58.33	-25:46:03.2	❶		❶	❶	❶	❶	❶	❶	❶	❶	❶	❶	❶	❶		❷	❶		❶	17
OH 231.8+4.2	7:42:16.83	-14:42:52.1		❶	❷		❶	❶	❶					❶		❶		❷	❶			11
Frosty Leo	9:39:53.96	+11:58:52.6			❶		❶	❶	❶					❶		❶		❶	❶			8
IRC+10216	9:47:57.38	+13:16:43.7			❶	❷		❶	❷	❷	❷		❷	❶	❶	❷	❷	❶	❶		❶	21
CIT 6	10:16:02.27	+30:34:18.6			❶			❶	❶					❶	❶	❶		❶	❶			8
V Hya	10:51:37.25	-21:15:00.3						❶	❶					❶	❶	❷		❶	❶			8
Boomerang Nebula	12:44:45.45	-54:31:11.4			❶		❶	❶	❶					❶		❶		❶	❶			8
Y CVn	12:45:07.83	+45:26:24.9							❶					❶	❶	❷			❶			6
W Hya	13:49:02.00	-28:22:03.5	❶	❶	❶	❶	❶	❶	❶	❶	❶	❶	❶	❶	❶	❶		❶	❶			16
IRAS 15194-5115	15:23:04.91	-51:25:59.0			❶			❶	❶					❶	❶	❷		❶	❶			9
NGC 6302	17:13:44.21	-37:06:15.9			❶		❶	❶	❶					❶		❶		❶	❶			8
AFGL5379	17:44:24.00	-31:55:35.0			❶		❶	❶	❶					❶		❶		❶	❶			8
IRAS 17436+5003	17:44:55.47	+50:02:39.5			❶		❶	❶	❶					❶		❶		❶	❶			8
OH26.5+0.6	18:37:32.51	-5:23:59.2			❶		❶	❶	❶					❶		❶		❶	❶	❶		9
S Sct	18:50:20.04	-7:54:27.4						❶	❶					❶	❶	❷		❶	❶			8
AFGL 2343	19:13:58.61	+0:07:31.9			❶		❶	❶	❶					❶		❶		❶	❶			8
W Aql	19:15:23.44	-7:02:49.9			❶		❶	❶	❶	❶				❶		❶		❶	❶			9
IRC+10420	19:26:48.10	+11:21:16.7		❶	❶		❶	❶	❶					❶		❶		❶	❶	❶		10
chi Cyg	19:50:33.92	+32:54:50.6	❶		❶	❶	❶	❶	❶	❶	❶	❶	❶	❶	❶	❶		❶	❶			15
V Cyg	20:41:18.27	+48:08:28.8			❶			❶	❶					❶	❶	❷		❶	❶			9
NML Cyg	20:46:25.54	+40:06:59.4			❶		❶	❶	❶					❶		❶		❶	❶			8
CRL 2688	21:02:18.27	+36:41:37.0			❶			❶	❶					❶		❶		❶	❶			7
NGC 7027	21:07:01.59	+42:14:10.2			❶		❶	❶	❶					❶		❶		❶	❶			8
S Cep	21:35:12.83	+78:37:28.2						❶	❶					❶	❶	❷		❶	❶			8
IRAS 22272+5435	22:29:10.37	+54:51:06.4			❶			❶	❶					❶				❶	❶			6
CRL3068	23:19:12.39	+17:11:35.4			❶			❶	❶					❶	❶			❶	❶			7
IRC+40540	23:34:27.66	+43:33:02.4			❶			❶	❶					❶	❶	❷		❶	❶			9
R Cas	23:58:24.87	+51:23:19.7			❷		❶	❶	❶	❶				❶		❶		❶	❶			10
Total OBSIDs per setting and grand total			5	5	36	7	23	36	39	12	7	5	7	37	16	46	2	39	38	3	3	366

O-rich AGB star
S-type AGB star
C-rich AGB star
Red Super-Giant
Yellow Hyper-Giant
O-rich post-AGBs (pPNe and young PNe)
C-rich post-AGB (pPNe and young Pne)

Table 1. Sources and spectral setups (settings) observed in the HIFISTARS KPGT

#	Setting name	LO Freq (GHz)	HIFI band	HPBW (")	T_{mb}/T_a*	Calib. unc.	Main target species (lines) Red LSB lines; Blue USB lines	
1	Set01	1864.7	7b	11.4	1.4	30%		H_2O* ($3_{2,2}$-$3_{1,3}$) H_2O ($5_{3,2}$-$5_{2,3}$)
2	Set02a	1794.3	7b	11.8	1.4	30%		H_2O ($7_{3,4}$-$7_{2,5}$)
3	Set03b	1757.8	7a	12.0	1.4	30%	$C^{18}O$ (16-15); H_2O* ($2_{1,2}$-$1_{0,1}$)	H_2O ($6_{3,3}$-$6_{2,4}$); ^{13}CO (16-15)
4	Set04	1714.3	7a	12.4	1.4	30%		H_2O ($3_{0,3}$-$2_{1,1}$); $H_2{}^{17}O$ ($3_{0,3}$-$2_{1,1}$)
5	Set05c	1200.8	5a	17.6	1.5	10%	SH_2 ($3_{1,2}$-$2_{1,2}$); H_2O* ($1_{1,1}$-$0_{0,0}$)	H_2O ($4_{2,2}$-$4_{1,3}$); $C_{18}O$ (11-10)
6	Set06d	1157.8	5a	18.3	1.5	10%	HCN (13-12); CO (10-9); H_2O ($3_{1,2}$-$2_{2,1}$)	H_2O ($3_{2,1}$-$3_{1,2}$)
7	Set07e	1107.1	4b	19.1	1.3	30%	^{13}CO (10-9); $H_2{}^{18}O$ ($1_{1,1}$-$0_{0,0}$)	^{29}SiO (26-25); H_2O ($1_{1,1}$-$0_{0,0}$)
8	Set08	1102.9	4b	19.2	1.3	30%	H_2O ($3_{1,2}$-$3_{0,3}$); $H_2{}^{17}O$ ($3_{1,2}$-$3_{0,3}$); $H_2{}^{18}O$ ($3_{1,2}$-$3_{0,3}$)	$H_2{}^{17}O$ ($1_{1,1}$-$0_{0,0}$)
9	Set09	995.6	4a	21.3	1.3	30%	H_2O ($2_{0,2}$-$1_{1,1}$); $H_2{}^{17}O$ ($2_{0,2}$-$1_{1,1}$); ^{13}CO (9-8)	
10	Set10	975.2	4a	21.7	1.3	30%	H_2O ($5_{2,4}$-$4_{3,1}$)	
11	Set11	758.9	2b	27.8	1.3	10%	H_2O ($2_{1,1}$-$2_{0,2}$)	
12	Set12f	653.7	2a	32.0	1.3	10%	SiO* (15-14)	^{13}CO (6-5); $C^{18}O$ (6-5); H_2O* ($1_{1,0}$-$1_{0,1}$)
13	Set13	614.8	1b	34.5	1.3	10%	SiO (14-13)	HCN (7-6); H_2O ($5_{3,2}$-$4_{4,1}$)
14	Set14g	564.5	1b	37.5	1.3	10%	H_2O ($1_{1,0}$-$1_{0,1}$); ^{29}SiO (13-12); SiO* (13-12)	NH_3 (1-0)
15	Set15	1665.6	6b	12.7	1.4	30%	$H_2{}^{17}O$ ($2_{1,2}$-$1_{0,1}$)	HCN* (19-18); H_2O ($2_{1,2}$-$1_{0,1}$)
16	Set16	1838.4	7b	11.6	1.4	30%	OH $^2\pi_{1/2}$ (3/2-1/2)	CO (16-15)
17	Set17	686.4	2a	30.8	1.3	10%	CN (6-5)	CO (6-5); $H^{13}CN$ (8-7); SiO (16-15)
18	NH3-2-1	1221.4	5a	17.3	1.5	10%	NH_3 (2-1)	H_2O ($2_{2,0}$-$2_{1,1}$)
19	NH3-3-2	1767.2	7a	12.0	1.4	30%	NH_3 (3-2)	HCN (20-19)

* after species denotes vibrationally excited lines

Table 2. Main parameters of the spectral setups used in the HIFISTARS project.

Obs. Id	Target	Dur.	SPG	AOR Label
1342190197	IK Tau	1623	8.2.1	Calibration_PM_2-HStars-Set17 - IK Tau
1342190198	IK Tau	617	8.2.1	Calibration_PM_2-HStars-Set12f - IK Tau
1342191560	NGC 6302	1575	6.1.0	PSP2_HStars-Set14g - NGC6302
1342191587	OH26.5+0.6	1575	6.1.0	PSP2_HStars-Set14g - OH26.5+0.6
1342191588	V Cyg	502	6.1.0	PSP1_HStars-Set13 - V Cyg
1342191589	CRL 618	1719	6.1.0	PSP1_HStars-Set14g - CRL618
1342191590	Betelgeuse	1575	6.1.0	PSP2_HStars-Set14g - Betelgeuse
1342191593	IK Tau	1575	6.1.0	SDP_HStars-Set13 - IK Tau
1342191594	IK Tau	1575	6.1.0	SDP_HStars-Set14g - IK Tau
1342191602	IK Tau	1505	6.1.0	SDP_HStars-Set09 - IK Tau
1342191603	IK Tau	1505	6.1.0	SDP_HStars-Set10 - IK Tau
1342191650	IK Tau	1487	6.1.0	SDP_HStars-Set08 - IK Tau
1342191651	IK Tau	1487	6.1.0	SDP_HStars-Set07e - IK Tau
1342191653	CRL 618	1679	6.1.0	SDP_HStars-Set07e - CRL618
1342191675	V Cyg	987	6.1.0	PSP1_HStars-Set07e - V Cyg
1342191700	V Cyg	1231	6.1.0	PSP1_HStars-Set06d - V Cyg
1342191702	CRL 618	1762	6.1.0	SDP_HStars-Set06d - CRL618
1342191719	IK Tau	1538	6.1.0	SDP_HStars-Set05c - IK Tau
1342191720	IK Tau	1618	6.1.0	SDP_HStars-Set06d - IK Tau
1342191723	CRL 618	1762	6.1.0	PSP1_HStars-Set05c - CRL618
1342191751	IK Tau	1618	6.1.0	SDP_HStars-Set11 - IK Tau
1342191766	CRL 618	3419	6.1.0	PSP1_HStars-Set03b - CRL618
1342191767	IK Tau	3851	6.1.0	SDP_HStars-Set03b - IK Tau
1342191768	IK Tau	3547	6.1.0	SDP_HStars-Set04 - IK Tau
1342191770	IK Tau	2992	6.1.0	SDP_HStars-Set16 - IK Tau
1342191771	IK Tau	1535	6.1.0	SDP_HStars-Set01 - IK Tau
1342191772	CRL 618	1615	6.1.0	SDP_HStars-Set16 - CRL618
1342191776	V Cyg	2018	6.1.0	PSP1_HStars-Set16 - V Cyg
1342192367	chi Cyg	1575	6.1.0	PSP1_HStars-Set14g - chi Cyg
1342192499	AFGL5379	1575	6.1.0	PSP2_HStars-Set14g - AFGL5379
1342192528	VY CMa	1575	6.1.0	PSP1_HStars-Set14g - VY CMa
1342192529	VY CMa	1575	6.1.0	PSP1_HStars-Set13 - VY CMa
1342192533	VY CMa	1623	6.1.0	PSP1_HStars-Set12f - VY CMa
1342192534	VY CMa	617	6.1.0	PSP1_HStars-Set17 - VY CMa
1342192535	Red Rectangle	657	6.1.0	PSP2_HStars-Set17 - RedRectangle
1342192536	CRL 618	1746	6.1.0	PSP1_HStars-Set12f - CRL618
1342192537	CRL 618	657	6.1.0	SDP_HStars-Set17 - CRL618
1342192538	V Cyg	1503	6.1.0	PSP1_HStars-Set12f - V Cyg
1342192539	V Cyg	1020	6.1.0	PSP1_HStars-Set17 - V Cyg
1342192540	chi Cyg	617	6.1.0	PSP1_HStars-Set17 - chi Cyg
1342192541	chi Cyg	1623	6.1.0	PSP1_HStars-Set12f - chi Cyg
1342192553	AFGL5379	617	6.1.0	PSP2_HStars-Set17 - AFGL5379
1342192554	NGC 6302	422	6.1.0	PSP2_HStars-Set17 - NGC6302
1342192555	NGC 6302	1515	6.1.0	PSP2_HStars-Set12f - NGC6302
1342192587	NGC 6302	1522	6.1.0	PSP2_HStars-Set05c - NGC6302
1342192606	chi Cyg	1538	6.1.0	PSP1_HStars-Set05c - chi Cyg
1342192607	chi cyg	1618	6.1.0	PSP1_HStars-Set06d - chi Cyg
1342192610	VY CMa	1618	6.1.0	PSP1_HStars-Set06d - VY CMa
1342192611	VY CMa	1538	6.1.0	PSP1_HStars-Set05c - VY CMa
1342192672	chi Cyg	2992	6.1.0	PSP1_HStars-Set16 - chi Cyg
1342194500	OH 231.8+4.2	1719	6.1.0	PSP1_HStars-Set14g - OH231.8
1342194501	BM Gem	1231	6.1.0	PSP2_HStars-Set14g - BM Gem
1342194526	IRC+10420	1575	6.1.0	PSP2_HStars-Set14g - IRC+10420
1342194527	chi Cyg	1575	6.1.0	PSP2_HStars-Set13 - chi Cyg

Table 3.1. List of HIFISTARS observations.

Obs. Id	Target	Dur.	SPG	AOR Label
1342194533	S Cep	502	6.1.0	PSP2_HStars-Set13 - S Cep
1342194534	BM Gem	502	6.1.0	PSP2_HStars-Set13 - BM Gem
1342194537	OH 231.8+4.2	1746	6.1.0	PSP1_HStars-Set12f - OH231.8
1342194538	OH 231.8+4.2	657	6.1.0	SDP_HStars-Set17 - OH231.8
1342194539	Red Rectangle	996	6.1.0	PSP2_HStars-Set12f - RedRectangle
1342194541	Betelgeuse	1746	6.1.0	PSP2_HStars-Set12f - Betelgeuse
1342194542	Betelgeuse	406	6.1.0	PSP2_HStars-Set17 - Betelgeuse
1342194543	BM Gem	780	6.1.0	PSP2_HStars-Set17 - BM Gem
1342194544	BM Gem	924	6.1.0	PSP2_HStars-Set12f - BM Gem
1342194547	S Cep	1020	6.1.0	PSP2_HStars-Set17 - S Cep
1342194548	S Cep	502	6.1.0	PSP2_HStars-Set12f - S Cep
1342194549	NGC 7027	657	6.1.0	SDP_HStars-Set17 - NGC7027
1342194550	CRL 2688	996	6.1.0	PSP2_HStars-Set12f - CRL2688
1342194551	CRL 2688	422	6.1.0	PSP2_HStars-Set17 - CRL2688
1342194552	IRC+10420	1746	6.1.0	PSP2_HStars-Set12f - IRC+10420
1342194553	IRC+10420	406	6.1.0	PSP2_HStars-Set17 - IRC+10420
1342194557	OH26.5+0.6	617	6.1.0	PSP2_HStars-Set17 - OH26.5+0.6
1342194558	OH26.5+0.6	1623	6.1.0	PSP2_HStars-Set12f - OH26.5+0.6
1342194570	chi Cyg	1618	6.1.0	PSP2_HStars-Set11 - chi Cyg
1342194667	Betelgeuse	1650	6.1.0	PSP2_HStars-Set05c - Betelgeuse
1342194680	VY CMa	1618	6.1.0	PSP1_HStars-Set11 - VY CMa
1342194774	OH26.5+0.6	2992	6.1.0	PSP2_HStars-Set16 - OH26.5+0.6
1342194775	NGC 7027	1615	6.1.0	SDP_HStars-Set16 - NGC7027
1342194778	Betelgeuse	3707	6.1.0	PSP2_HStars-Set02a - Betelgeuse
1342194779	Red Rectangle	4433	6.1.0	PSP2_HStars-Set16 - RedRectangle
1342194780	OH 231.8+4.2	2936	6.1.0	SDP_HStars-Set16 - OH231.8
1342194781	VY CMa	1535	6.1.0	PSP1_HStars-Set01 - VY CMa
1342194782	VY CMa	2992	6.1.0	PSP1_HStars-Set16 - VY CMa
1342194786	VY CMa	1487	6.1.0	PSP1_HStars-Set08 - VY CMa
1342194787	VY CMa	1487	6.1.0	PSP1_HStars-Set07e - VY CMa
1342194788	OH 231.8+4.2	1679	6.1.0	SDP_HStars-Set07e - OH231.8
1342194789	Red Rectangle	1551	6.1.0	PSP2_HStars-Set07e - RedRectangle
1342194791	Betelgeuse	1487	6.1.0	PSP2_HStars-Set07e - Betelgeuse
1342194793	NGC 7027	1679	6.1.0	SDP_HStars-Set07e - NGC7027
1342194797	chi Cyg	1487	6.1.0	PSP1_HStars-Set07e - chi Cyg
1342194809	OH26.5+0.6	1487	6.1.0	PSP2_HStars-Set07e - OH26.5+0.6
1342195017	chi Cyg	1505	6.1.0	PSP2_HStars-Set09 - chi Cyg
1342195018	chi Cyg	1505	6.1.0	PSP2_HStars-Set10 - chi Cyg
1342195039	VY CMa	1505	6.1.0	PSP1_HStars-Set10 - VY CMa
1342195040	VY CMa	1505	6.1.0	PSP1_HStars-Set09 - VY CMa
1342195054	Red Rectangle	1522	6.1.0	PSP2_HStars-Set06d - RedRectangle
1342195055	OH 231.8+4.2	1762	6.1.0	SDP_HStars-Set06d - OH231.8
1342195056	OH 231.8+4.2	1762	6.1.0	PSP1_HStars-Set05c - OH231.8
1342195057	Betelgeuse	1762	6.1.0	PSP2_HStars-Set06d - Betelgeuse
1342195058	BM Gem	1231	6.1.0	PSP2_HStars-Set06d - BM Gem
1342195060	NGC 7027	1762	6.1.0	SDP_HStars-Set06d - NGC7027
1342195061	CRL 2688	1522	6.1.0	PSP2_HStars-Set06d - CRL2688
1342195062	IRC+10420	1650	6.1.0	PSP2_HStars-Set05c - IRC+10420
1342195063	IRC+10420	1762	6.1.0	PSP2_HStars-Set06d - IRC+10420
1342195078	OH26.5+0.6	1538	6.1.0	PSP2_HStars-Set05c - OH26.5+0.6
1342195079	OH26.5+0.6	1618	6.1.0	PSP2_HStars-Set06d - OH26.5+0.6
1342195104	Red Rectangle	3517	6.1.0	PSP2_HStars-Set03b - RedRectangle
1342195105	VY CMa	3547	6.1.0	PSP1_HStars-Set04 - VY CMa
1342195106	VY CMa	3851	6.1.0	PSP1_HStars-Set03b - VY CMa

Table 3.2. cont.

Obs. Id	Target	Dur.	SPG	AOR Label
1342195107	OH 231.8+4.2	3628	2.8.0	PSP1_HStars-Set03b - OH231.8
1342195108	CRL 2688	3314	6.1.0	PSP2_HStars-Set03b - CRL2688
1342195109	OH26.5+0.6	3851	6.1.0	PSP2_HStars-Set03b - OH26.5+0.6
1342195113	IRC+10420	3835	2.8.0	PSP2_HStars-Set03b - IRC+10420
1342195114	chi Cyg	3547	6.1.0	PSP2_HStars-Set04 - chi Cyg
1342195115	chi Cyg	3851	6.1.0	PSP1_HStars-Set03b - chi Cyg
1342195117	chi Cyg	1535	6.1.0	PSP2_HStars-Set01 - chi Cyg
1342195120	CRL 2688	1615	6.1.0	PSP2_HStars-Set16 - CRL2688
1342195121	IRC+10420	3707	6.1.0	PSP2_HStars-Set02a - IRC+10420
1342195122	IRC+10420	3627	6.1.0	PSP2_HStars-Set16 - IRC+10420
1342195794	IRC+10216	1575	6.1.0	PSP1_HStars-Set14gB - 10216
1342195795	CIT 6	502	6.1.0	PSP1_HStars-Set13 - CIT-6
1342196412	Frosty Leo	1575	6.1.0	PSP2_HStars-Set14g - FrostyLeo
1342196413	IRC+10216	1575	6.1.0	PSP1_HStars-Set14g - 10216
1342196415	IRC+10216	550	6.1.0	PSP2_HStars-Set13 - 10216
1342196416	CIT 6	4719	6.1.0	PSP1_HStars-Set14g - CIT-6
1342196418	CIT 6	987	6.1.0	PSP1_HStars-Set07e - CIT-6
1342196419	IRC+10216	5223	6.1.0	PSP2_HStars-Set08 - 10216
1342196420	IRC+10216	1600	6.1.0	PSP1_HStars-Set07eB - 10216
1342196421	IRC+10216	1600	6.1.0	PSP1_HStars-Set07e - 10216
1342196422	IRC+10216	5223	6.1.0	PSP2_HStars-Set08B - 10216
1342196424	Frosty Leo	1551	6.1.0	PSP2_HStars-Set07e - FrostyLeo
1342196431	chi Cyg	1487	6.1.0	PSP2_HStars-Set08 - chi Cyg
1342196434	CRL 2688	1487	6.1.0	PSP2_HStars-Set07e - CRL2688
1342196458	S Cep	987	6.1.0	PSP2_HStars-Set07e - S Cep
1342196476	IRC+10216	1231	6.1.0	PSP2_HStars-Set12f - 10216
1342196477	IRC+10216	1267	6.1.0	PSP2_HStars-Set17 - 10216
1342196478	CIT 6	1020	6.1.0	PSP1_HStars-Set17 - CIT-6
1342196479	CIT 6	924	6.1.0	PSP1_HStars-Set12f - CIT-6
1342196480	Frosty Leo	1515	6.1.0	PSP2_HStars-Set12f - FrostyLeo
1342196481	Frosty Leo	422	6.1.0	PSP2_HStars-Set17 - FrostyLeo
1342196484	IRC+10216	1618	6.1.0	PSP1_HStars-Set11B - 10216
1342196485	IRC+10216	1618	6.1.0	PSP1_HStars-Set11 - 10216
1342196487	IRC+10216	1359	6.1.0	PSP2_HStars-Set06d - 10216
1342196488	Frosty Leo	1522	6.1.0	PSP2_HStars-Set05c - FrostyLeo
1342196489	CIT 6	1231	6.1.0	PSP1_HStars-Set06d - CIT-6
1342196512	S Cep	924	6.1.0	PSP2_HStars-Set06d – S Cep
1342196513	Frosty Leo	1522	6.1.0	PSP2_HStars-Set06d – FrostyLeo
1342196539	IRC+10216	1615	6.1.0	PSP1_HStars-Set15 - 10216
1342196540	IRC+10216	1615	6.1.0	PSP1_HStars-Set15B - 10216
1342196545	IRC+10216	5206	6.1.0	PSP2_HStars-Set04B - 10216
1342196546	Frosty Leo	3314	6.1.0	PSP2_HStars-Set03b - FrostyLeo
1342196559	NGC 7027	3429	6.1.0	nSP_HStars-Set03b - NGC7027
1342196560	V Cyg	3429	6.1.0	nSP_HStars-Set03b - V Cyg
1342196561	IRAS 22272+5435	3426	6.1.0	nSP_HStars-Set03b - IRAS22272+5435
1342196562	IRAS 17436+5003	3426	6.1.0	nSP_HStars-Set03b - IRAS17436+5003
1342196563	CIT 6	2137	6.1.0	PSP1_HStars-Set03b - CIT-6
1342196564	IRC+10216	1332	6.1.0	PSP2_HStars-Set03b - 10216
1342196565	IRC+10216	5206	6.1.0	PSP2_HStars-Set04 - 10216
1342196567	R Dor	3755	6.1.0	nSP_HStars-Set03b - R Dor
1342196569	R Dor	3207	6.1.0	nSP_HStars-Set16 - R Dor
1342196570	VY Cma	3207	6.1.0	nSP_HStars-Set16 - VY CMa
1342196571	OH 231.8+4.2	3412	6.1.0	nSP_HStars-Set02a - OH231.8
1342196572	OH 231.8+4.2	3016	6.1.0	nSP_HStars-Set16 - OH231.8

Table 3.3. cont.

Obs. Id	Target	Dur.	SPG	AOR Label
1342196573	Frosty Leo	2517	6.1.0	PSP2_HStars-Set16 - FrostyLeo
1342196575	IRC+10216	1308	6.1.0	PSP2_HStars-Set16 - 10216
1342196583	NML Cyg	3867	6.1.0	nSP_HStars-Set16 - NML Cyg
1342196584	IRAS 17436+5003	3016	6.1.0	nSP_HStars-Set16 - IRAS17436+5003
1342196585	IRAS 22272+5435	3016	6.1.0	nSP_HStars-Set16 - IRAS22272+5435
1342196587	S Cep	2018	6.1.0	PSP2_HStars-Set16 - S Cep
1342196588	CIT 6	2018	6.1.0	PSP1_HStars-Set16 - CIT-6
1342196591	IRC+10216	1621	6.1.0	PSP1_HStars-Set09B - 10216
1342196592	IRC+10216	1621	6.1.0	PSP1_HStars-Set09 - 10216
1342196598	IRAS 17436+5003	1746	6.1.0	nSP_HStars-Set12f - IRAS17436+5003
1342196599	NGC 7027	1746	6.1.0	nSP_HStars-Set12f - NGC 7027
1342197972	IRAS 17436+5003	1519	6.1.0	nSP_HStars-Set07e - IRAS17436+5003
1342197975	NML Cyg	1519	6.1.0	nSP_HStars-Set07e - NML Cyg
1342197977	IRAS 22272+5435	1519	6.1.0	nSP_HStars-Set07e - IRAS22272+5435
1342197978	R Cas	1487	6.1.0	nSP_HStars-Set08 - R Cas
1342197979	R Cas	1487	6.1.0	nSP_HStars-Set07e - R Cas
1342197980	IRC+40540	987	6.1.0	nSP_HStars-Set07e - IRC+40540
1342197981	CRL3068	1308	6.1.0	nSP_HStars-Set07e - CRL3068
1342197982	R Dor	1487	6.1.0	nSP_HStars-Set07e - R Dor
1342197983	R Dor	1487	6.1.0	nSP_HStars-Set08 - R Dor
1342197987	V Hya	987	6.1.0	nSP_HStars-Set07e - V Hya
1342197992	Y CVn	987	6.1.0	nSP_HStars-Set07e - Y CVn
1342198335	R Cas	1575	6.1.0	nSP_HStars-Set14g - R Cas
1342198348	IRAS 22272+5435	1618	6.1.0	nSP_HStars-Set06d - IRAS22272+5435 - resched
1342198349	IRAS 17436+5003	1618	6.1.0	nSP_HStars-Set06d - IRAS17436+5003 - resched
1342198350	IRAS 17436+5003	1650	6.1.0	nSP_HStars-Set05c - IRAS17436+5003 - resched
1342198351	NGC 7027	1650	6.1.0	nSP_HStars-Set05c - NGC7027 - resched
1342198352	NML Cyg	1650	6.1.0	nSP_HStars-Set05c - NML Cyg - resched
1342198353	NML Cyg	1762	6.1.0	nSP_HStars-Set06d - NML Cyg - resched
1342198354	CRL3068	924	6.1.0	nSP_HStars-Set06d - CRL3068 - resched
1342198355	R Dor	1618	6.1.0	nSP_HStars-Set06d - R Dor - resched
1342198356	R Dor	1538	6.1.0	nSP_HStars-Set05c - R Dor - resched
1342198359	V Hya	924	6.1.0	nSP_HStars-Set06d - V Hya - resched
1342198361	V Hya	2062	6.1.0	nSP_HStars-Set16 - V Hya - resched
1342199096	V Hya	502	6.1.0	nSP_HStars-Set12f - V Hya
1342199097	V Hya	1020	6.1.0	nSP_HStars-Set17 - V Hya
1342199098	Y CVn	1020	6.1.0	nSP_HStars-Set17 - Y CVn
1342199099	Y CVn	502	6.1.0	nSP_HStars-Set12f - Y CVn
1342199152	IRAS 17436+5003	1575	6.1.0	nSP_HStars-Set14g - IRAS17436+5003 - resched
1342199153	V Cyg	1986	6.1.0	nSP_HStars-Set14gB - V Cyg - resched
1342199154	V Cyg	1986	6.1.0	nSP_HStars-Set14g - V Cyg - resched
1342199167	NML Cyg	1575	6.1.0	nSP_HStars-Set14g - NML Cyg - resched
1342199168	NGC 7027	1575	6.1.0	nSP_HStars-Set14g - NGC7027 - resched
1342199169	IRC+40540	1986	6.1.0	nSP_HStars-Set14g - IRC+40540 - resched
1342199170	IRC+40540	502	6.1.0	nSP_HStars-Set13 - IRC+40540 - resched
1342199171	IRC+40540	1986	6.1.0	nSP_HStars-Set14gB - IRC+40540 - resched
1342199174	Y CVn	502	6.1.0	nSP_HStars-Set13 - Y CVn - resched
1342199175	Y CVn	1986	6.1.0	nSP_HStars-Set14g - Y CVn - resched
1342199176	Y CVn	1986	6.1.0	nSP_HStars-Set14gB - Y CVn - resched
1342199180	V Hya	502	6.1.0	nSP_HStars-Set13 - V Hya - resched
1342199181	V Hya	1986	6.1.0	nSP_HStars-Set14gB - V Hya - resched
1342199182	V Hya	1986	6.1.0	nSP_HStars-Set14g - V Hya - resched
1342199278	R Cas	3207	6.1.0	nSP_HStars-Set16 - R Cas
1342199279	IRC+40540	2062	6.1.0	nSP_HStars-Set16 - IRC+40540

Table 3.4. cont.

Obs. Id	Target	Dur.	SPG	AOR Label
1342199280	CRL3068	2062	6.1.0	nSP_HStars-Set16 - CRL3068
1342199281	IRC+10011	1585	6.1.0	nSP_HStars_Set01 - IRC+1011
1342200901	IRC+10011	1575	6.1.0	nSP_HStars-Set14g - IRC+10011
1342200902	IRC+10011	1575	6.1.0	nSP_HStars-Set13 - IRC+10011
1342200904	omi Cet	1575	6.1.0	nSP_HStars-Set14g - omi Cet
1342200906	R Dor	1575	6.1.0	nSP_HStars-Set14g - R Dor - resched
1342200912	Boomerang Nebula	1575	6.1.0	nSP_HStars-Set14g - Boomerang Nebula
1342200929	W Hya	1575	6.1.0	PSP2_HStars-Set14g - W Hya
1342200930	W Hya	1575	6.1.0	PSP2_HStars-Set13 - W Hya
1342200951	W Hya	1505	6.1.0	PSP2_HStars-Set09 - W Hya
1342200958	W Hya	1505	6.1.0	PSP2_HStars-Set10 - W Hya
1342200963	IRC+10011	1505	6.1.0	nSP_HStars-Set10 - IRC+10011
1342200964	IRC+10011	1505	6.1.0	nSP_HStars-Set09 - IRC+10011
1342200966	IRC+10011	1623	6.1.0	nSP_HStars-Set12f - IRC+10011
1342200967	IRC+10011	617	6.1.0	nSP_HStars-Set17 - IRC+10011
1342200968	R Dor	617	6.1.0	nSP_HStars-Set17 - R Dor
1342200969	R Dor	1623	6.1.0	nSP_HStars-Set12f - R Dor
1342200970	omi Cet	1623	6.1.0	nSP_HStars-Set12f - omi Cet
1342200971	omi Cet	617	6.1.0	nSP_HStars-Set17 - omi Cet
1342200972	IRC+40540	1020	6.1.0	nSP_HStars-Set17 - IRC+40540
1342200973	IRC+40540	1231	6.1.0	nSP_HStars-Set12f - IRC+40540
1342200974	R Cas	1623	6.1.0	nSP_HStars-Set12f - R Cas
1342200975	R Cas	617	6.1.0	nSP_HStars-Set17 - R Cas
1342200976	IRAS 22272+5435	996	6.1.0	nSP_HStars-Set12f - IRAS22272+5435
1342200977	IRAS 22272+5435	406	6.1.0	nSP_HStars-Set17 - IRAS22272+5435
1342200978	IRAS 17436+5003	406	6.1.0	nSP_HStars-Set17 - IRAS17436+5003
1342200980	W Hya	617	6.1.0	PSP2_HStars-Set17 - W Hya
1342200981	W Hya	1623	6.1.0	PSP2_HStars-Set12f - W Hya
1342200990	Boomerang Nebula	406	6.1.0	nSP_HStars-Set17 - Boomerang Nebula
1342200991	Boomerang Nebula	1746	6.1.0	nSP_HStars-Set12f - Boomerang Nebula
1342200993	Boomerang Nebula	1519	6.1.0	nSP_HStars-Set07e - Boomerang Nebula
1342200998	W Hya	1487	6.1.0	PSP2_HStars-Set07e - W Hya
1342200999	W Hya	1487	6.1.0	PSP2_HStars-Set08 - W Hya
1342201068	IRC+10011	1487	6.1.0	nSP_HStars-Set07e - IRC+10011
1342201069	IRC+10011	1487	6.1.0	nSP_HStars-Set08 - IRC+10011
1342201070	omi Cet	1487	6.1.0	nSP_HStars-Set07e - omi Cet
1342201071	omi Cet	1487	6.1.0	nSP_HStars-Set08 - omi Cet
1342201106	W Hya	1618	6.1.0	PSP2_HStars-Set06d - W Hya
1342201107	W Hya	1538	6.1.0	PSP2_HStars-Set05c - W Hya
1342201112	Boomerang Nebula	1650	6.1.0	nSP_HStars-Set05c - Boomerang Nebula
1342201113	Boomerang Nebula	1618	6.1.0	nSP_HStars-Set06d - Boomerang Nebula
1342201114	omi Cet	1538	6.1.0	nSP_HStars-Set05c - omi Cet
1342201115	omi Cet	1618	6.1.0	nSP_HStars-Set06d - omi Cet
1342201116	IRC+10011	1618	6.1.0	nSP_HStars-Set06d - IRC+10011
1342201117	IRC+10011	1538	6.1.0	nSP_HStars-Set05c - IRC+10011
1342201118	IRC+40540	924	6.1.0	nSP_HStars-Set06d - IRC+40540 - resched
1342201539	W Hya	1618	6.1.0	PSP2_HStars-Set11 - W Hya
1342201545	IRC+10011	1618	6.1.0	nSP_HStars-Set11 - IRC+10011
1342201639	W Hya	1535	6.1.0	PSP2_HStars-Set01 - W Hya
1342201640	W Hya	3611	6.1.0	nSP_HStars-Set02a - W Hya
1342201641	W Hya	2992	6.1.0	PSP2_HStars-Set16 - W Hya
1342201646	Boomerang Nebula	3016	6.1.0	nSP_HStars-Set16 - Boomerang Nebula
1342201664	omi Cet	3207	6.1.0	nSP_HStars-Set16 - omi Cet
1342201665	IRC+10011	3207	6.1.0	nSP_HStars-Set16 - IRC+10011

Table 3.5. cont.

Obs. Id	Target	Dur.	SPG	AOR Label
1342201737	R Cas	1538	6.1.0	nSP_HStars-Set05c - R Cas
1342201738	R Cas	1618	6.1.0	nSP_HStars-Set06d - R Cas
1342201781	Boomerang Nebula	3429	6.1.0	nSP_HStars-Set03b - Boomerang Nebula
1342201782	R Dor	3755	6.1.0	nSP_HStars-Set03b - R Dor - resched
1342201783	omi Cet	3883	6.1.0	nSP_HStars-Set03b - omi Cet
1342201784	IRC+10011	3547	6.1.0	nSP_HStars-Set04 - IRC+10011
1342201785	IRC+10011	3755	6.1.0	nSP_HStars-Set03b - IRC+10011
1342201786	IRC+40540	3429	6.1.0	nSP_HStars-Set03b - IRC+40540
1342201787	R Cas	3755	6.1.0	nSP_HStars-Set03b - R Cas
1342201788	W Hya	3547	6.1.0	PSP2_HStars-Set04 - W Hya
1342202046	IRAS 15194-5115	1020	6.1.0	nSP_HStars-Set17 - IRAS15194-5115
1342202047	IRAS 15194-5115	924	6.1.0	nSP_HStars-Set12f - IRAS15194-5115
1342202050	IRAS 15194-5115	1986	6.1.0	nSP_HStars-Set14gB - IRAS15194-5115
1342202051	IRAS 15194-5115	1986	6.1.0	nSP_HStars-Set14g - IRAS15194-5115
1342202052	IRAS 15194-5115	502	6.1.0	nSP_HStars-Set13 - IRAS15194-5115
1342203248	IK Tau	3207	6.1.0	nSP_HStars-Set16 - IK Tau
1342203935	V384 Per	987	6.1.0	nSP_HStars-Set07e - V384 Per
1342204005	V384 Per	1986	6.1.0	nSP_HStars-Set14gB - V384 Per
1342204008	V384 Per	1986	6.1.0	nSP_HStars-Set14g - V384 Per
1342204534	CRL 618	3412	6.1.0	nSP_HStars-Set02a - CRL618
1342204535	CRL 618	2253	6.1.0	nSP_HStars-Set16 - CRL618
1342204707	AFGL5379	1623	6.1.0	PSP2_HStars-Set12f - AFGL5379
1342204741	AFGL5379	1618	6.1.0	PSP2_HStars-Set06d - AFGL5379
1342205309	TX Cam	1575	6.1.0	nSP_HStars-Set14g - TX Cam
1342205329	TX Cam	617	6.1.0	nSP_HStars-Set17 - TX Cam
1342205330	TX Cam	1623	6.1.0	nSP_HStars-Set12f - TX Cam
1342205764	TX Cam	3207	6.1.0	nSP_HStars-Set16 - TX Cam
1342205765	Betelgeuse	3627	6.1.0	PSP2_HStars-Set16 - Betelgeuse
1342205803	NGC 6302	2517	6.1.0	PSP2_HStars-Set16 - NGC6302
1342206388	AFGL5379	1487	6.1.0	PSP2_HStars-Set07e - AFGL5379
1342207382	IRC+10420	1487	6.1.0	PSP2_HStars-Set07e - IRC+10420
1342207389	BM Gem	1201	6.1.0	PSP2_HStars-Set07e - BM Gem
1342210660	NML Cyg	406	6.1.0	nSP_HStars-Set17 - NML Cyg
1342210661	NML Cyg	1746	6.1.0	nSP_HStars-Set12f - NML Cyg
1342210685	CRL3068	502	6.1.0	nSP_HStars-Set13 - CRL3068 - resched
1342210702	CRL3068	1020	6.1.0	nSP_HStars-Set17 - CRL3068
1342210703	CRL3068	1503	6.1.0	nSP_HStars-Set12f - CRL3068
1342213335	IRAS 15194-5115	2062	6.1.0	nSP_HStars-Set16 - IRAS15194-5115
1342213694	R Cas	3776	6.1.0	nSP_HStars-Set03b - R Cas - resched
1342213695	W Hya	3776	6.1.0	PSP2_HStars-Set03b - W Hya - resched
1342213696	IRAS 15194-5115	2539	6.1.0	nSP_HStars-Set03b - IRAS15194-5115
1342213710	V384 Per	1020	6.1.0	nSP_HStars-Set17 - V384 Per
1342214327	CRL 618	1575	6.1.0	nSP_HStars-Set14gC - CRL 618
1342214329	S Cep	454	6.1.0	nSP_HStars-Set14g - S Cep
1342214330	S Cep	454	6.1.0	nSP_HStars-Set14gB - S Cep
1342214415	NGC 6302	1551	6.1.0	PSP2_HStars-Set07e - NGC6302
1342214420	IRAS 15194-5115	987	6.1.0	nSP_HStars-Set07e - IRAS15194-5115
1342214444	AFGL5379	1538	6.1.0	PSP2_HStars-Set05c - AFGL5379
1342214445	NGC 6302	1522	6.1.0	PSP2_HStars-Set06d - NGC6302
1342214491	AFGL5379	2992	6.1.0	PSP2_HStars-Set16 - AFGL5379
1342215852	IRAS 15194-5115	924	6.1.0	nSP_HStars-Set06d - IRAS15194-5115
1342216703	AFGL5379	3776	6.1.0	PSP2_HStars-Set03b - AFGL5379
1342216704	NGC 6302	3493	6.1.0	PSP2_HStars-Set03b - NGC6302
1342217722	TX Cam	1487	6.1.0	nSP_HStars-Set08 - TX Cam

Table 3.6. cont.

Obs. Id	Target	Dur.	SPG	AOR Label
1342217723	TX Cam	1487	6.1.0	nSP_HStars-Set07e - TX Cam
1342217732	TX Cam	1618	6.1.0	nSP_HStars-Set06d - TX Cam
1342217733	TX Cam	1538	6.1.0	nSP_HStars-Set05c - TX Cam
1342218421	TX Cam	3776	6.1.0	nSP_HStars-Set03b - TX Cam
1342218422	Betelgeuse	3776	6.1.0	PSP2_HStars-Set03b - Betelgeuse
1342218891	S Sct	502	6.1.0	nSP_HStars-Set12f - S Sct
1342219247	AFGL 2343	1519	6.1.0	nSP_HStars-Set07e - AFGL2343
1342219291	AFGL 2343	1575	6.1.0	nSP_HStars-Set14g - AFGL2343
1342219454	CRL 2688	1392	6.1.0	nSP_HStars-Set14g - CRL2688
1342219460	AFGL 2343	1746	6.1.0	nSP_HStars-Set12f - AFGL2343
1342219461	AFGL 2343	406	6.1.0	nSP_HStars-Set17 - AFGL2343
1342219475	AFGL 2343	3776	6.1.0	nSP_HStars-Set03b - AFGL2343
1342219477	AFGL 2343	3867	6.1.0	nSP_HStars-Set16 - AFGL2343
1342220517	OH 231.8+4.2	1959	6.1.0	PSP1_HStars-Set03b - OH231.8 – resch – short
1342220518	NML Cyg	3776	6.1.0	nSP_HStars-Set03b - NMLCyg
1342221422	CRL3068	2253	6.1.0	nSP_HStars-Set03b - CRL3068
1342226021	IK Tau	1650	7.1.0	NH3-2-1 - IKTau
1342226032	IK Tau	3104	7.1.0	NH3-3-2 - IK Tau
1342226033	omi Cet	3776	7.1.0	nSP_HStars-Set03b - omi Cet - resched - 2
1342228564	Red Rectangle	1431	7.3.0	HStars-Set14g - RedRectangle
1342229849	S Sct	2062	7.3.0	nSP_HStars-Set16 - S Sct
1342229850	W Aql	3207	7.3.0	nSP_HStars-Set16 - W Aql
1342229877	W Aql	1487	7.3.0	nSP_HStars-Set08 - W Aql
1342229878	W Aql	1487	7.3.0	nSP_HStars-Set07e - W Aql
1342229879	S Sct	987	7.3.0	nSP_HStars-Set07e - S Sct
1342229893	W Aql	1623	7.3.0	nSP_HStars-Set12f - W Aql
1342229894	W Aql	617	7.3.0	nSP_HStars-Set17 - W Aql
1342229895	S Sct	1020	7.3.0	nSP_HStars-Set17 - S Sct
1342229940	W Aql	1618	7.3.0	nSP_HStars-Set06d - W Aql - resched
1342229941	W Aql	1538	7.3.0	nSP_HStars-Set05c - W Aql - resched
1342229942	S Sct	924	7.3.0	nSP_HStars-Set06d - S Sct
1342229943	OH26.5+0.6	1650	7.3.0	NH3-2-1 - OH26.5+0.6
1342229946	AFGL 2343	1762	7.3.0	nSP_HStars-Set06d - AFGL2343 - resched2
1342229947	AFGL 2343	1650	7.3.0	nSP_HStars-Set05c - AFGL2343 - resched2
1342229948	IRC+10420	1650	7.3.0	NH3-2-1 - IRC10420
1342230382	W Aql	1575	7.3.0	nSP_HStars-Set14g - W Aql
1342230384	S Sct	1986	7.3.0	nSP_HStars-Set14g - S Sct
1342230385	S Sct	1986	7.3.0	nSP_HStars-Set14gB - S Sct
1342230386	S Sct	502	7.3.0	nSP_HStars-Set13 - S Sct
1342230401	W Aql	3776	7.3.0	nSP_HStars-Set03b - W Aql
1342230403	VY CMa	3104	7.3.0	NH3-3-2 - VYCMa
1342233281	IRC+10216	2058	7.3.0	NH3-3-2 - IRC10216

Table 3.7. cont.