Thirty Sixth Meeting of the Hipparcos Science Team

Venice, 5–6 April 1995

Attendance:

HST: Dr U. Bastian, Prof. P.L. Bernacca, Dr M. Crézé, Prof. F. Donati, Prof. M. Grewing (first day), Prof. E. Høg, Prof. J. Kovalevsky, Dr F. van Leeuwen, Dr L. Lindegren, Dr H. van der Marel, Dr F. Mignard, Mr C.A. Murray, Mr R.S. Le Poole, Dr H. Schrijver, Dr C. Turon

ESTEC: M.A.C. Perryman

Unable to attend: Dr M. Grenon

The agenda attached was adopted.

Actions agreed at the meeting are included at the end of the Minutes.

1. General Project Status

Perryman gave an overview of the overall project status. The main activities outstanding are the catalogue, photometry, and double star merging, reference frame link, Tycho photometry, catalogue publication (printed and CD-ROM versions) and associated documentation.

Schedule: the consortia are continuing to target completion of all mission products (or necessary preparatory work) by end 1995, with availability of these at the end of 1996, thus: merged main catalogue, annexes, double stars (with the exception of difficult cases), epoch photometry, definition of data products and data formats, catalogue introduction, 3-volume technical accompanying volumes, concepts for printed version, CD-ROM, and inclusion within CDS data base. The revised schedule for TDAC involves finalisation of the astrometric catalogue at the same time as the main mission catalogue completion (end 1995), with the photometric catalogue completed in mid-1996, and with general data release 1 Jan 1997 at the same time as the remaining mission products. This schedule allows coordination of the data appearing on the Tycho and HIP CD-ROMs.

Further details of the recommendations of the Documentation Working Group, which met on 4 April, are given under Item 12.

2. TDAC Progress

Høg reported on the overall TDAC status and schedule (Annex I). H30-T30 systematic errors reported at the last meeting have now been fully eliminated. A revised schedule has been proposed (see Item 1). Høg reported on results of quality assessment work carried out on T30e, which would lead to a classification of different quality flags in the final catalogue. Double star results were also presented; these showed a constant bias with respect to the Hipparcos separations. Geometric calibration parameters showed increased scatter for the last few weeks of the mission. Finally, Høg reported plans for a second processing of the Tycho data (with Wicenec and Bastian), to start at the end of 1996, and expected to lead to a further 1.5 million stars with positional determinations. The HST agreed with Høg's proposal that this investigation may be considered as an 'individual research programme', beyond the terms of the existing consortia activities.

Bastian reported on the progress in photometry: T magnitudes have now been dropped (from both mean and epoch photometry) due to inconsistency and bias. The number of epoch photometry stars is expected to be between 200–300 000, to be decided following the analysis of TPOC2 in around October 1995. Nevertheless, it was agreed that the Priou epoch data set would contain the number of stars limited to a single CD-ROM. The present schedule was as follows: 1 Oct—final format, and provisional release of all files to Priou; 1 Feb 1996—final release of all Hipparcos data files (including B_T and V_T) to Priou; 1 August 1996—final release of all Tycho files and documentation to Priou; 1 November 1996—provisional CD-ROM expected from Priou for tests; 1 December 1996—mass production of CD-ROMs; 1 Jan 1997—release to the community.

The question of the release of Tycho mean data to proposers would be finalised later in the year as the overall schedule became clearer (Action 1).

3. NDAC Report

Lindegren presented results of studies conducted on the 37-month solution (see Annex II). N37.03, delivered to Schrijver, now contains solutions for 111 492 stars (73 116 primary) at epoch 1991.25, and includes improved chromaticity modelling. An ad hoc catalogue, N37.04, comprising N37.03 and double star solution data (2236 photocentre, 8330 from the primary) has a total of 116 030 entries, and is considered suitable for comparison with F37i, and for distribution to the RFWG.

4. FAST Report

Kovalevsky reported results of the second FAST 37-month iterated solution which will soon be completed (see Annex III). Improved software for the RGCs has been included, and the 3rd and 4th order calibration terms have been frozen from the previous solution. All test statistics are very well-behaved, with Fisher test statistics around 1.008. About 150–200 RGCs are to be re-run. The new sphere solution, including light bending, should

be completed before the next FAST meeting in mid-May.

5. Sphere Comparisons, etc

Lindegren showed some early results of a new comparison between N37.03 and F37i. Generally, this looked very good, but with some remaining N-S parallax discrepancy still evident.

6. Main Astrometric Catalogue Merging

Murray presented the results from F. Arenou's study of the merging of the sphere solutions from FAST and NDAC (see Annex IV). This work had proceeded very rapidly, and now pointed to improvements in the respective sphere solutions needed by FAST and NDAC before further work could be completed. Some anomalies still existed (Mignard reported that the improvements in the combined astrometric parameters appeared to be too good!). A meeting was planned for mid-May, in Paris, and would include Arenou, Murray, Lindegren, Mignard, and possibly van der Marel. The radial velocity corrections for 22 stars, included so far by NDAC but not by FAST, could be included at the merging stage, and this would be investigated by Lindegren/Arenou (Action 2). Perryman asked whether the validity of the merged correlation coefficients could be investigated by positional comparisons with, e.g., distant, high proper motion FK5 stars, but this was considered unrealistic.

7. Global Sphere Solutions

Lindegren reported as follows (text taken from CUO GCR Report No. 227). The global solution software has been tested on the first 17 orbits in the mission, and all known bugs found in these tests have now been removed, but there are still a few things to be done. The right hand sides and the spin-phase updates look reasonable. The normal equation solver needs to be adjusted, for almost all objects a solution is found for both position and parallax, and that is not reasonable for a one month solution (but the parameter updates are normally just a fraction of a mas or just a few mas, as expected). A subroutine for calculating the covariance matrix also needs to be implemented. It takes 12 minutes to solve for 17 orbits. Extrapolating this gives less than 2 days for the whole mission, so there should be time for a few full scale tests and iterations.

The question of how a successful global sphere solution should be incorporated within the common mission products was discussed. If the accuracy gains are marginal (say, $< 5\%$), the global solution might be ignored. Otherwise, a revised merging strategy would have to be formulated, and this might have implications for the catalogue completion schedule. Under these circumstances, one possibility (raised by Bastian) might be to maintain the release date to the community, and share the delay between the internal and 1982 proposers. A decision would only be sought once the destiny of the global sphere solution becomes clearer.

8. Double Star Working Group Report

Mignard provided a report on the progress of the Double Star Working Group (Annex V). Merged results for 11 000 systems had been supplied by the Italian groups in mid-March, another 7000 will come only from CERGA. Some 1000 systems appear completely different in the FAST and NDAC solutions, and a strategy for the merging of the FAST and NDAC data (Annex VI) was proposed. During April–June, FAST will provide final relative astrometry, then the merging will start.

Bastian reported on the work on astrometric binaries being undertaken in ARI. For the previously unknown systems, R. Wielen was coordinating the work on the longer period systems (where $\dot{\mu}$ is significant), with Bernstein and Bastian investigating shorter period systems where a period search could be undertaken. So far, some 60 systems had been investigated (those with large χ^2), of which 30 were new. A few hundred such systems might ultimately be included in the catalogue, with some 2000 having significant $\dot{\mu}$. Lindegren had been able to confirm periods found by Bernstein for several objects. Bastian would reflect on any specific requirements arising from the ARI work with respect to the Double Star Annex (Action 3).

9. Photometry Working Group Report

Van Leeuwen provided a short report on the progress of the Photometry Working Group. Work had been held up by the non-availability of the ageing corrections required for the final calibrations, themselves required before the NDAC and FAST merging could take place. Otherwise, NDAC had completed inclusion of objects from the other field of view. FAST had re-organised their data base. If ageing corrections were not forthcoming by end of May, the merging would proceed without it. van Leeuwen would propose layouts for the photometric annex tables (Action 4).

10. Report from Reference Frame Working Group

Kovalevsky reported on the status of the activities. The group had met on 15 February, and the minutes of the meeting had been circulated to the HST members. F37.04 (see Item 5) would go (via Schrijver for merging, and Turon for distribution, with inputs on data sets to be circulated from Kovalevsky) in time for work to be advanced before the next RFWG meeting on 6 July. VLBI now had 10 stars with acceptable solutions. The final inputs to the solution were needed from all groups by around October. Results on Magellanic Clouds were not yet available, but would be checked by M. Froeschlé (see Action 5).

11. Results Data Base

Schrijver reported on the progress of the results data base (Annex VII). PS files of the main catalogue and the double star annex had been created, and Schrijver considered that

the PS files could be created at Utrecht for the final catalogue. Tests would be conducted accordingly. The checksum had also been implemented for the printed catalogue. See also Actions 6–10.

12. Documentation Working Group Activities

A summary of the major items concluded at the DWG meeting the previous day is included hereafter:

(a) after a long discussion on time scales, it was agreed that the epoch photometry would be based on TT(TAI) = TAI + 32.184 (where TAI = UTC + 25,26,...). Thus the photometric time scale would be the same as the astrometric time scale, being also continuous, and providing continuity with ephemeris time. Photometric observations would be corrected for light propagation time to the solar system barycentre.

(b) Murray/Bastian/Kovalevsky would provide a clarification to the use of ICRS in the context of the J2000/FK5 systems used previously (Action 11).

(c) TDAC has suppressed T magnitudes for both mean and epoch photometry; and this will be reflected in the next issue of the catalogue introduction.

(d) PPM proper motions for Tycho would be included within the Priou CD-ROMs but not within the ASCII CD-ROMs.

(e) HD/PPM/DM(3) identifiers would be included in the main mission products, and these plus the variable star identifier would be added in the Priou CD-ROM.

(f) all files (i.e., including the epoch photometry files) will appear in ASCII, not binary format.

(g) the term 'Descriptor' has been chosen to replace the term 'Identifier' in the main catalogues, and the sexagesimal positions will be given at epoch 1991.25 for both Hipparcos and Tycho.

(h) Version 14 of the catalogue introduction would be compiled in July, and all inputs and criticisms from HST members for the new issue were invited.

(i) A draft introduction would be completed by the end of 1995 for circulation to the internal/1982 proposers (so that they can understand the data that has been circulated to them). In this context, it was agreed that the data circulated to 1982 and internal proposers would comprise the requested (approved) astrometric data, along with all elements of the covariance matrix.

(j) the CD-ROM software Version 3 was extensively discussed, and recommendations were noted separately by Turon.

(k) for the final documentation, the following guidelines were adopted for the construction of instrumental plots: where feasible and convenient, plots showing the instrument evolution should use the following guidelines to ease intercomparisons:

(1) origin for the time scale:

1989 January 0, 0hr (= 1988 December 31, 0 hr) = JD 2447526.5

[i.e., so that 1989 January 1, 0 hr is 1.0 in the plot]

(2) abscissa extending from 200 to 1600 (labelled as 200, 400,... 1600)

(3) abscissa axis: labelled as 'Days from 1989 January 0'

(4) abscissa scale: 1 cm per 100 days, i.e. total axis width = 14 cm (i.e., not including axis legend).

(5) ordinate scale: where reasonable, the major tick marks could be at intervals of 1 cm (with a total vertical size of approx 14 cm)

13. Minor Planet Status in NDAC/FAST

Work on this topic is expected to pick up if the appointment of D. Hestroffer to a research fellowship in ESTEC is confirmed. In that case, Hestroffer would coordinate the publication of the entire NDAC/FAST/TDAC data sets of solar system observations.

14. Miscellaneous

(a) A&A Papers: Grewing reported that many of the submitted papers had passed the refereeing process. Publication would be expected towards the end of the year. If late papers (Perryman: HR diagram; Turon: Schmidt plates) could be submitted within the next month or so, it might be possible to allocate the correct number of pages to them, so that they could appear at the same time as the others.

(b) Project completion conference/ceremony: various locations were again discussed, including the material supplied by Grenon concerning Rhodos (see also minutes of HST35). After a lengthy discussion, a short list was proposed and agreed: Rhodes, Amsterdam, Paris, and Venice. A closed ballot was then held, with the 15 persons present invited to give their first and second choice (one person did not give a second choice). The results, giving number of first/second choices, were: Venice (9/5), Amsterdam (3/1), Paris (2/5), Rhodes (1/3). Consequently, Bernacca was invited to investigate further the consequences of holding the meeting in Venice (Action 12). A decision would be made at the next meeting.

(c) Horizon 2000+: Perryman reported on the activities on GAIA, which had led to the proposal to hold a workshop on the topic in Cambridge in June. About 60–70 persons had so far indicated their intention to participate.

(d) Status of ad hoc/Form B/TDAC proposals: Perryman had circulated a summary before the meeting. Proposals recommended by TDAC were endorsed in totality by the

HST. Perryman reported on the Form B's that he had received, which were largely without contention. HST approved the idea for a light-bending paper (Kovalevsky and Lindegren expect their final results in about 4–6 weeks). All outstanding ad hoc proposals were approved, unless Turon identifies a significant overlap between the proposals and existing 1982 proposals.

15. Next Meetings

HST: The 37th meeting of the HST will be held on 14–15 September 1995, in the Observatoire de Paris (hosted by Turon). A meeting of the documentation working group will be scheduled for the previous day (13 September).

The 38th meeting of the HST will be held on 5–6 December 1995, in Leiden (hosted by Le Poole). A meeting of the documentation working group will be scheduled for the previous day (4 December). These dates will be finally confirmed as the catalogue completion schedule becomes clearer.

M.A.C. Perryman, 10 April 1995

Distribution: HST, A. Wicenec, J.L. Halbwachs

Actions

36.1 HST to decide on schedule and policy for distribution of Tycho photometry data to proposers.

36.2 Lindegren/Arenou to investigate inclusion of radial velocity corrections in the merging software.

36.3 Bastian to reflect on requirements for the double star annex arising from the ARI astrometric binary work, and communicate these to Lindegren.

36.4 van Leeuwen to provide inputs for the photometric annex tables, by end April.

36.5 Kovalevsky/Froeschlé to provide inputs to RFWG using Magellanic Cloud results.

36.6 van Leeuwen to submit σ_{V-I} to Schrijver for results data base

36.7 Schrijver would consider the introduction of a new HIP number to cover the cases of misidentified stars.

36.8 Schrijver/Turon would continue to reflect on the definition and use of the out-of-order flag (Field H1) in the printed and CD-ROM catalogues.

36.9 Lindegren to provide trial double star data to Schrijver for use in the final catalogue production tests.

36.10 Schrijver to provide details of checksum construction to Perryman and Crézé; latter to attempt OCR reading of the tables supplied to verify use of the checksum.

36.11 Murray/Bastian/Kovalevsky to provide a clarification to the use of ICRS in the context of the J2000/FK5 systems used previously.

36.12 Bernacca to investigate further the consequences of holding the final Hipparcos celebration meeting in Venice.

From Previous Meeting(s)

35.6 Høg to communicate an appropriate Tycho astrometric solution, for deposit in the Utrecht results data base, in due course.

35.8 Notes for the Utrechts results data base would be expected as follows: (a) misidentifications collated by Meudon, from Turon; (b) stars not detected by the star mapper, or wrong by 15–60 arcsec, or incorrectly identified double systems or variable stars, from van Leeuwen; (c) notes on finding charts and other photometric discrepancies (e.g. $V-I$ updates), from Grenon; (d) anomalies from the sphere solution, from Mignard and Lindegren (who would reflect on the categorisation of such discrepancies).

35.9 Printed Variable Star Annex: Grenon/Turon/Priou to consider how the smoothed light curves (e.g., from AAVSO) are to be incorporated into the CD-ROM.

35.10 Grenon/van Leeuwen to provide an iterated variable star annex format proposal (and how the data are to be incorporated within the CD-ROM) by end October; including a proposed schedule for 1995 covering the cleaning/merging and construction of light curves. Perryman would then 'take over' the proposed format definition as part of the overall catalogue format definition.

35.14 Mignard and Lindegren to reflect on possible contents/format of the intermediate astrometric data file for release with the final catalogue data (whether independent FAST/NDAC results are to be made available, how this fits with the concept of a merged solution, etc). See Annex II.

35.15 Grenon/Turon to finalise plans and schedule for the Finding Chart Volume of the main catalogue (e.g. LMC/SMC and cluster charts to be based on GSC scans, etc; update INCA volume using revised identifications and photometry, etc).

35.18 HST members to reflect on the location of the Hipparcos catalogue completion ceremony. Proponents to prepare their cases in advance of the next HST meeting, to allow a decision to be made on the location.

Documentation Working Group Meeting

Venice

4 April: 09:00 - 18:00

Agenda

(This provides an aide memoire rather than a detailed agenda to be followed)

1. The CD-ROM development:
   - review of Version 3 report by Denis Priou
   - proposed data content
   - proposed target platforms
   - evaluation group
   - progress
   - documentation
   - schedule
   - logistics of mastering, production, distribution
   - inter-relationship of HIP and TYCHO CD-ROMS
   - scheduling of CD-ROMS

2. The printed Hipparcos Catalogue:
   - present status of the main catalogue, problems, future drafts
     (Version 12 has been distributed, 24-2-95)
   - checksum
   - production at Utrecht
   - double star annex (LL)
   - variable star catalogue, contents, formats, and partitioning (MG/FvL)
   - policy for finding charts, cf INCA, and clusters, LMC/SMC (CT)
   - logistics of production and distribution, and schedule
   - cover design
   - distribution policy and address lists

3. The CD-ROM version(s) of Hipparcos and Tycho Catalogues:
   - contents, formats and specifications
     - specification of main catalogue data
     - specification of covariance data
     - specification of double star data
     - specification of photometric data
     - inclusion of INCA data
     - inclusion of radial velocities and spectral types (CT/Priou)
     - inclusion of ecliptic/galactic coordinates
   - logistics of production, packaging, documentation
   - distribution policy and address lists

4. The status of the explanatory documentation (Volumes 2-4):
   - contents
   - overall schedule
   - cover design
   - distribution policy and address lists

Goals: The goals of the DWG Meeting are to review the status of all documentation planned for the project, and ensure its proper completion by 31 December 1995.

Attendance: Perryman, Bernacca, van Leeuwen, Lindegren, Mignard, Schrijver, Turon, Hoeg, Bastian, Murray, Kovalevsky

Agreed at the TDAC meeting and following discussion:

Tycho Catalogue Generation (TCG) Mar.- Dec.95:
==========

incl. details for the astrometry at CUO:		
CUO:receives the last IT from AIT		1 Apr 95
Main proc. at CUO, add 7 months -> AT,	T37e	15 Apr
Reprocessing at CUO ->OE	TU37a	
Reprocessing ->AT + planetary objects	TU37b	1 Jun
Reprocessing ->Fs, but not Ta	TU37c	
Main processing ->Fs, but not Ta	T37f	
CUO: Quality flagging -> TC.R and TC.U		1 Aug
CUO: Merging of TC.R and TC.U -> TC.RU1		
CUO: Redundancy analysis -> TC.RU2		
CUO: Numbering at CUO of TYC3		
CUO: Rejection of redundant stars (ie. TYC3=0)		
-> TYC_CUO_11 send to ARI, CDS, AIT		1 Sep
ARI, CDS, AIT use the TYC_CUO_11 to make their contribution		
and send in TBD format to CUO		1 Nov
CUO: Double stars, OEC -> resolved comp., rho<3 arcsec		
Resolved comp. + TC.RU2 -> TC.RU3 , changes only TYC3		1 Nov
CUO makes final TYC version		
incl. double stars and		
final rotation to HIP system, after Nov 1995		1 Dec 95

With best regards Erik

erik@astro.ku.dk

Annex I

T30e Quality Assessment

1. TD 252: N_{acc} , σ_{pos} , CN

Q: 1 .. 4 , [5 , 6]

False Stars ?

2.

$\sigma_{abs} = 1''/\sqrt{3}$
$= 577$ mas

$$\sigma^2_{obsf} = \frac{1}{4}\left(\sigma_x^2 + \sigma_y^2\right)\left(N_{acc} - 5\right)$$

---

3. Compi 10 stars.

45 00 in TIC R
32 00 in classes B4-B4
9 3 00 also $\sigma_{obsf} < 3$ [illegible] mas

29 stars on plates
- 10 true
- 11 false
- 8 galaxies

+ 240 stars : 69 galaxies ($b > 30°$)

Empty Fields : T_a 10.6 - 11.2
$\sigma_{obsf} > 300$

4. Quality classes B1 .. B6

B6 : $N_{acc} \leq 30$ or $\sigma_5 \geq 150$ mas or $CN \geq 3$

B1 : $\sigma_{obsf} < 300$ $\sigma_5 < 50$ 676 000

B2 : $\sigma_{obsf} < 300$ 263 000

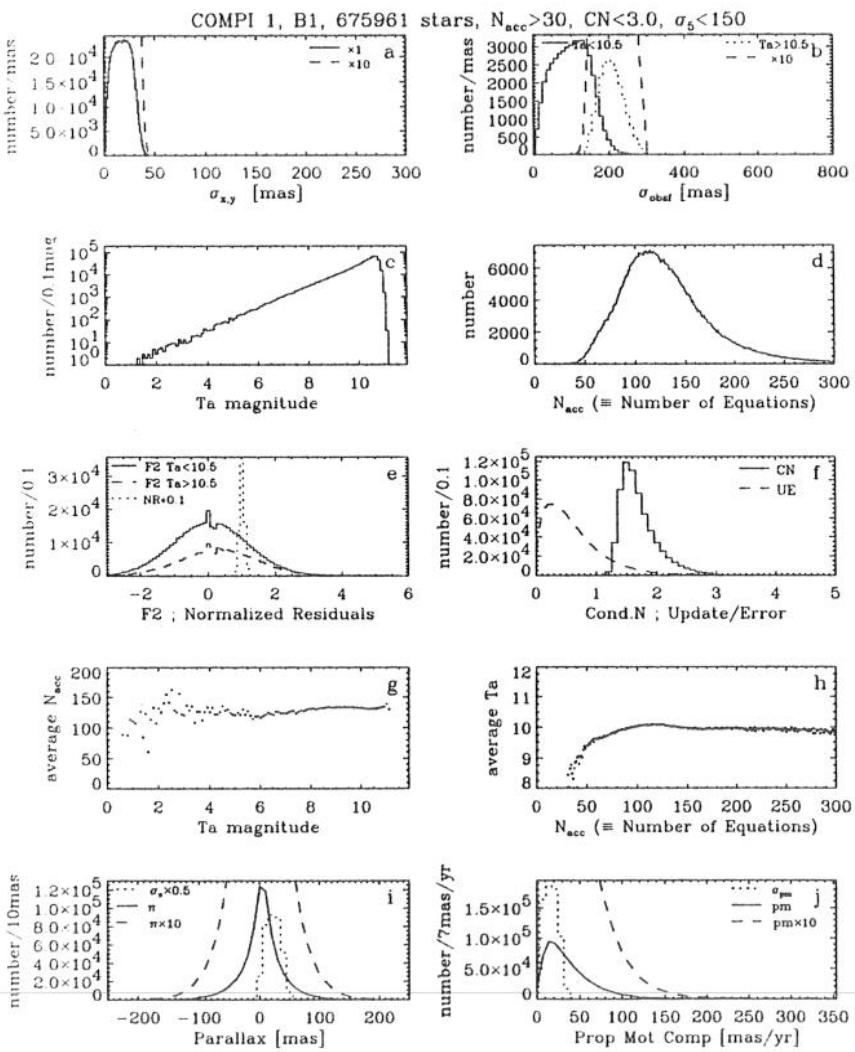
B3, B4 $\sigma_{obsf} \geq 300$ 73 000

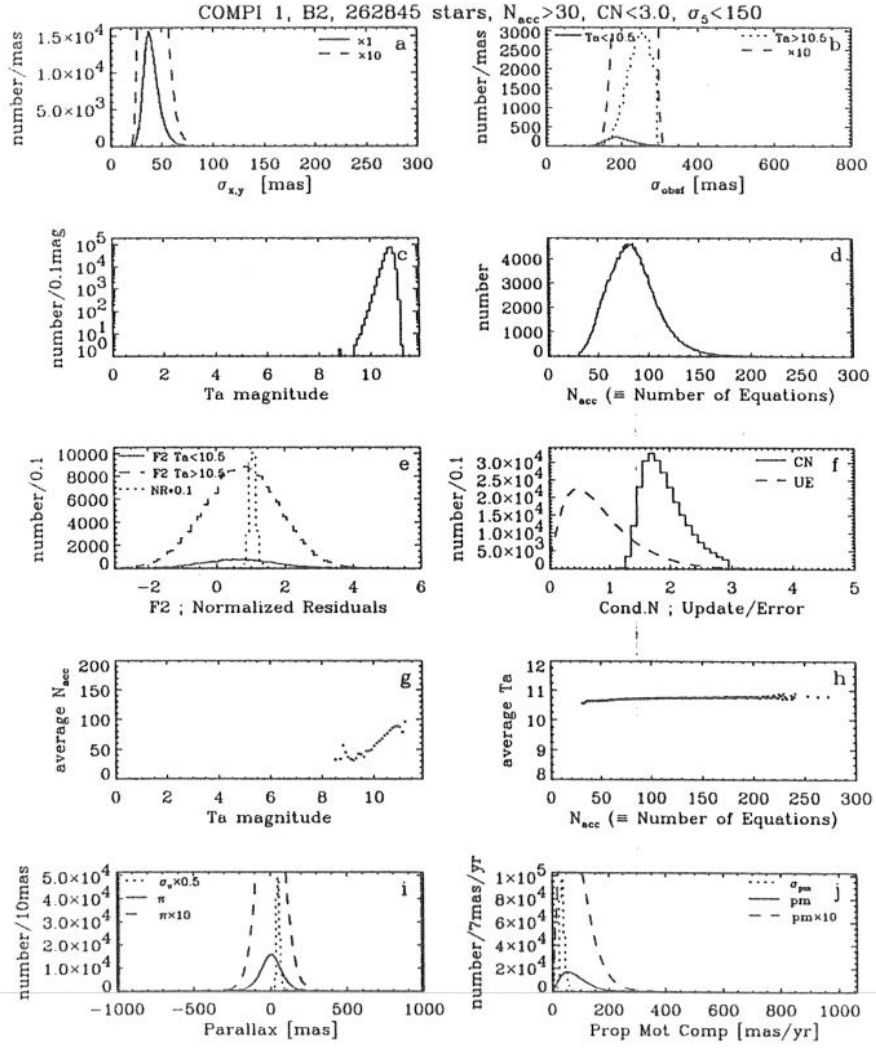
---

5. B3, B4 COMPI) 73000 stars

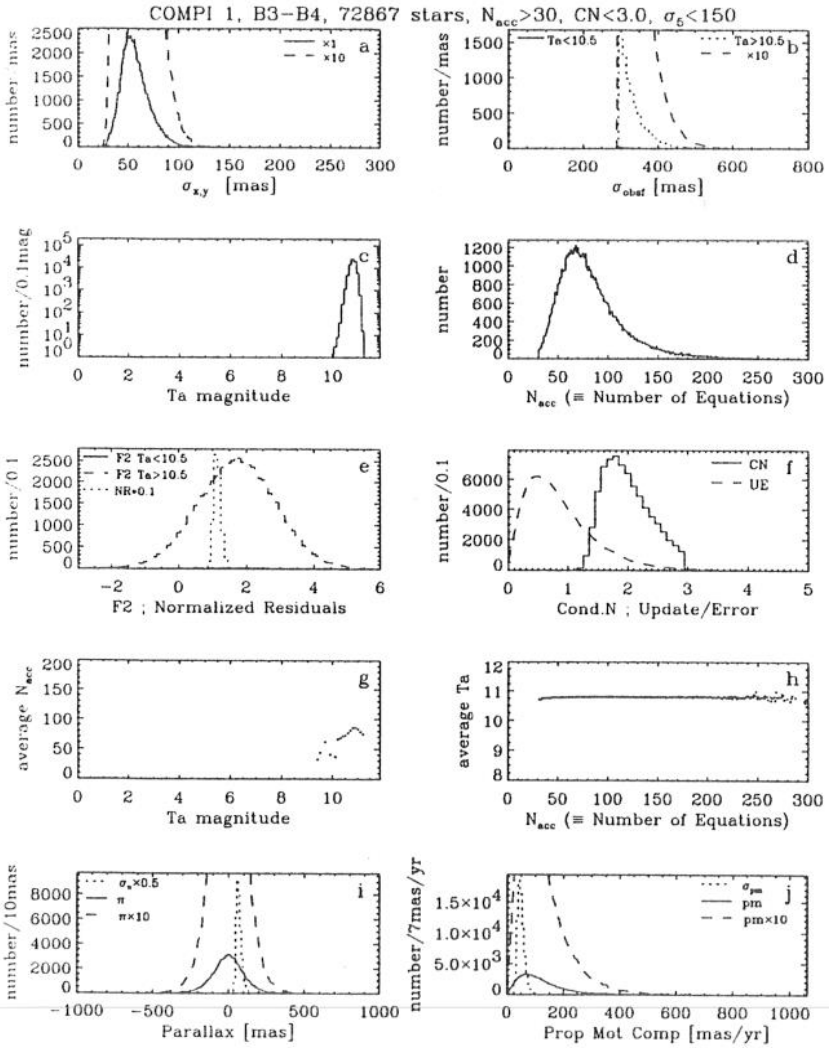
$\bar{\tau}_a < 10.5$ 653 stars

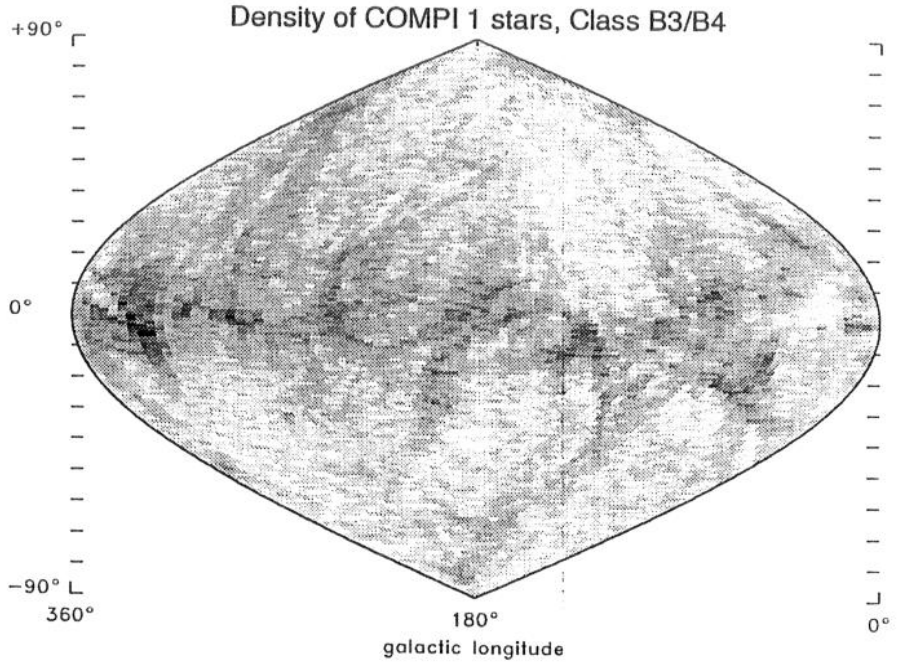
14 Mar 95 Astrometry





6 Mar 1995 10:01





3 Mar 1995 14:39

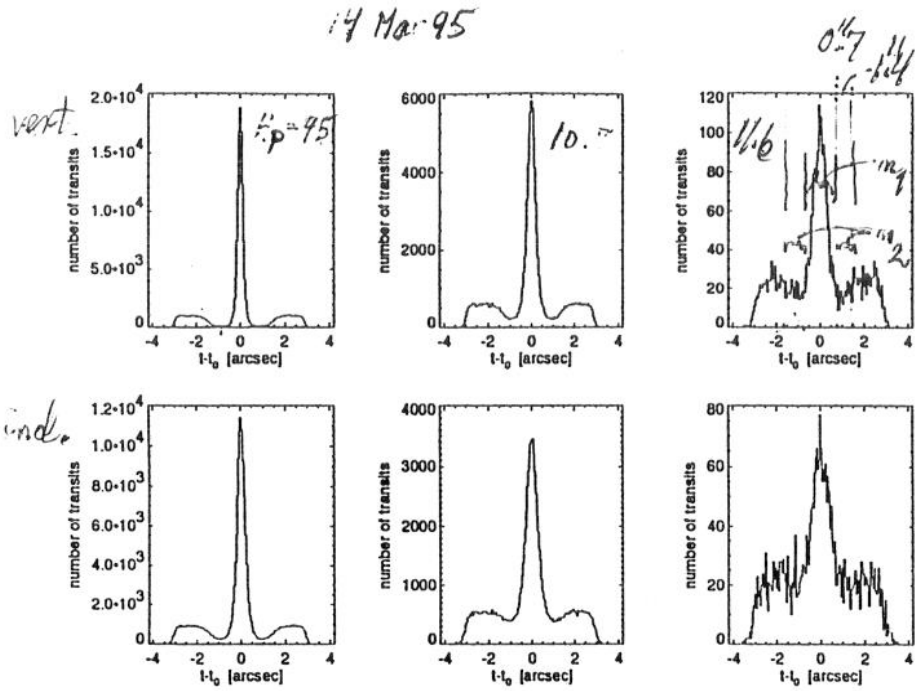


Figure 1: Distributions of transits on vertical (upper row) and inclined slits (lower row) on astrometric residuals for stars with Hp magnitude in bins of 0.2 mag width, centered at 9.8, 10.7 and 11.6 mag sequentially.

$$\text{slope} \equiv m_1 - m_2$$

$$F \equiv \frac{m_1 - m_2}{\sigma_{m_1 - m_2}} = \frac{m_1 - m_2}{\sqrt{m_1 + m_2}}$$

B1:

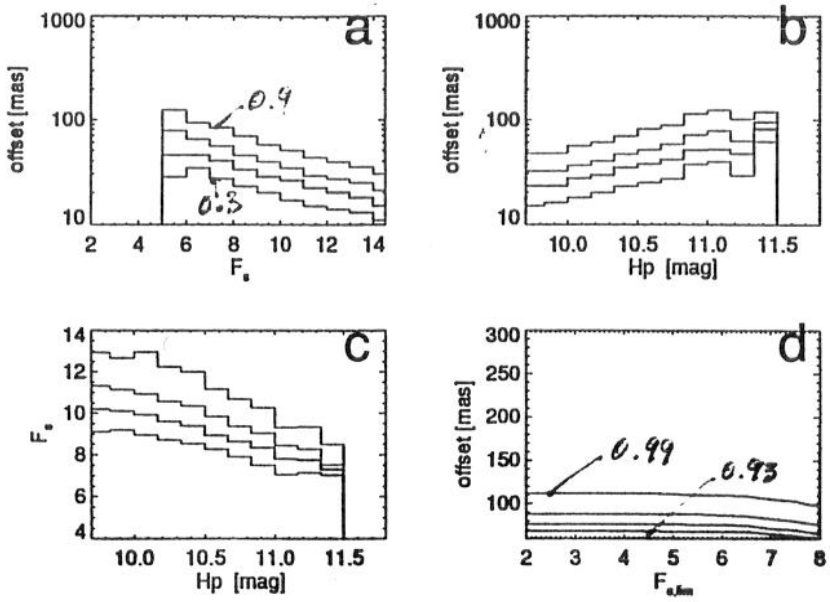


Figure 2: Quantiles of the offset and F_s statistics on the sample of 9243 quality 1 stars. **a**, **b** and **c**: Histograms of the 0.3, 0.5 (median, thick line), 0.7 and 0.9 quantiles are drown, in ascending order. **d**: The 0.93, 0.95, 0.97 and 0.99 quantiles, representing extreme outliers of the sample, are drawn as function of applied limiting F_s value.

Sample of stars: H30 star ; $T_{mag} > 10$ mag;
$N_{acc} > 30$; $CN < 3$; $\sigma_{obsf} < 300$ mas ; $\sigma_5 < 150$ mas.

Quality	σ_5	n_{sample}	n_{T30e}
B1	< 50 mas	9243 st	676 660
B2	> 50	2602	263 440
			73 040

$\sigma_{obsf} > 300$: B3/B4

B2:

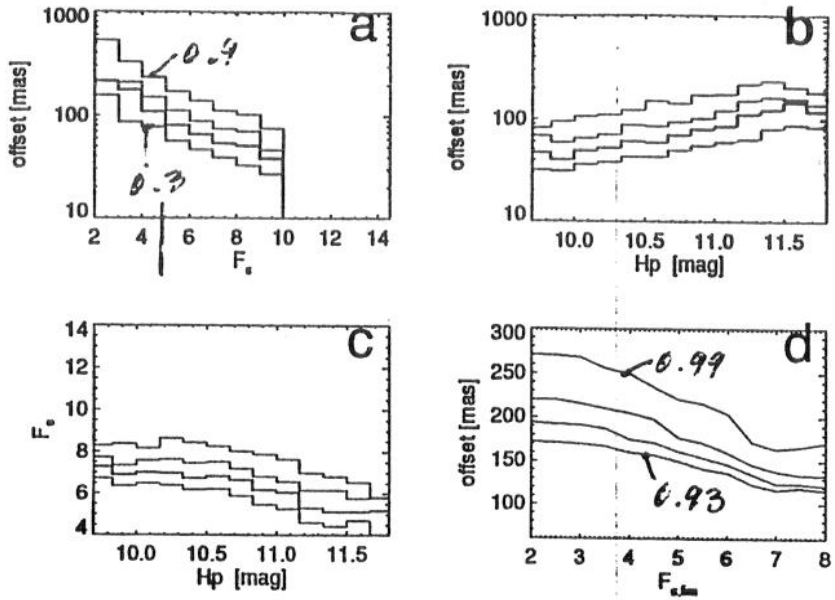


Figure 3: The same as in Fig.2, but for the sample of 2002 quality 2 stars.

14 Mar 95

H30 stars

H_p = 9.96

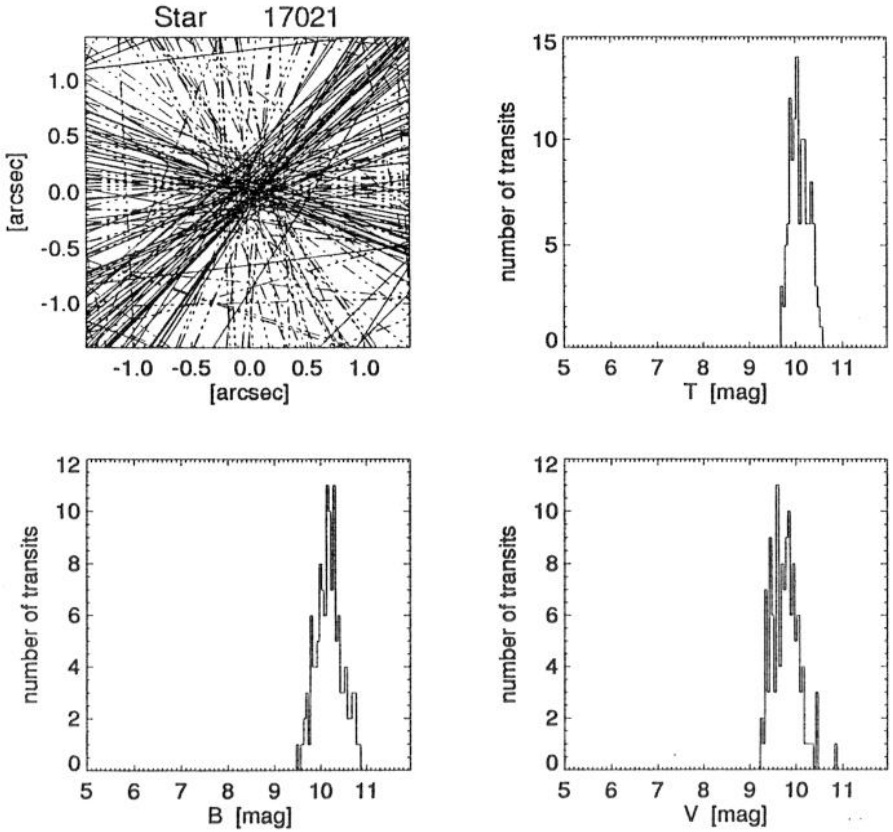
H30: B-V = 0.52

T_{med} = 10.07

T_{compm} = 10.2

F_s = 10.5

F_s = 10.5



H_p = 10.41

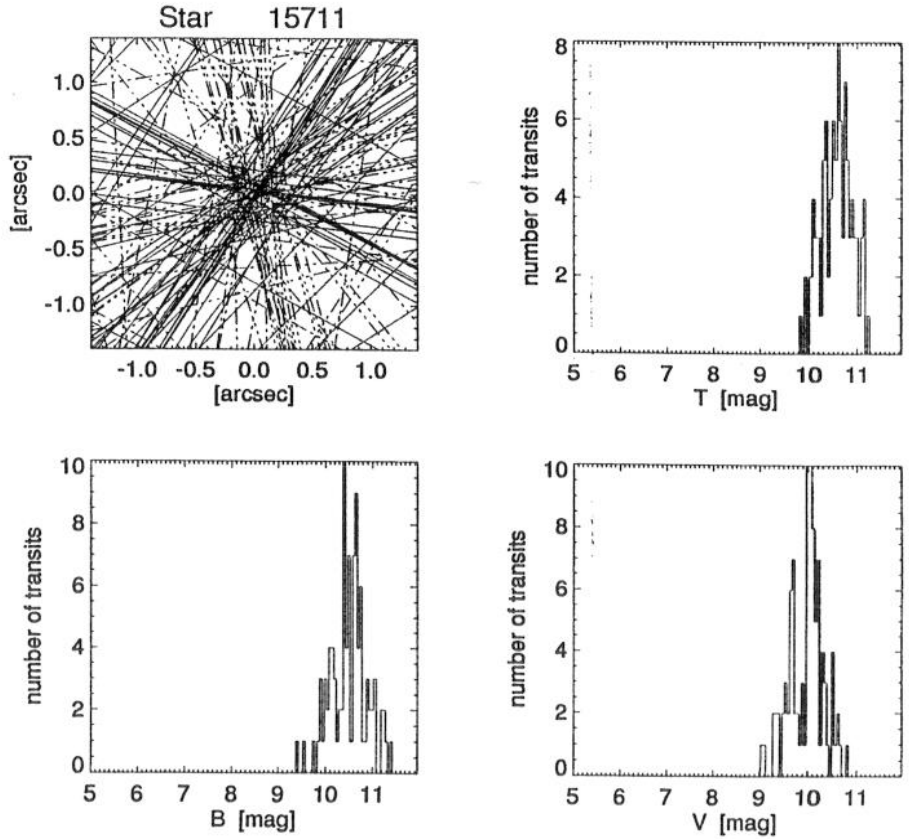
H30: B-V = 0.61

T_{med} = 10.6

T_{compm} = 10.5

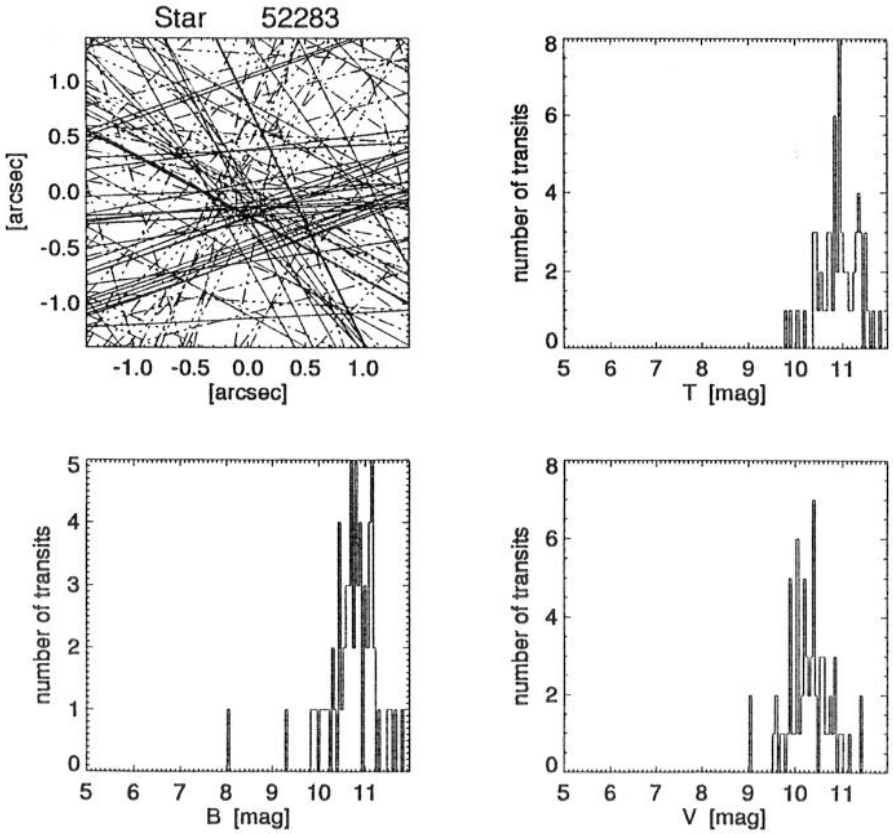
F_s = 8.1

F_s = 8.1



H_t = 11.04
H30: B-V = 0.56
T_{med} = 10.95
T_{compm} = 10.75
F_s = 4.9

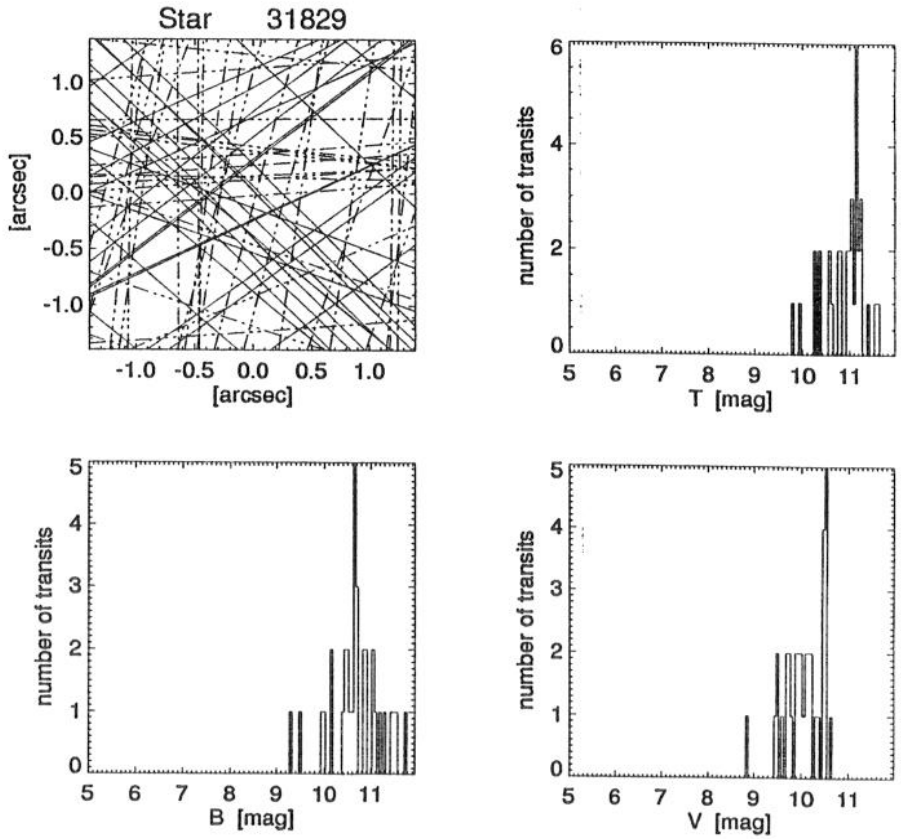
F_s = 4.9



H_p = 10.31
H30: B-V = 3.45
T_{med} = 11.03
F_s = 3.68

B-V HIC 2.59

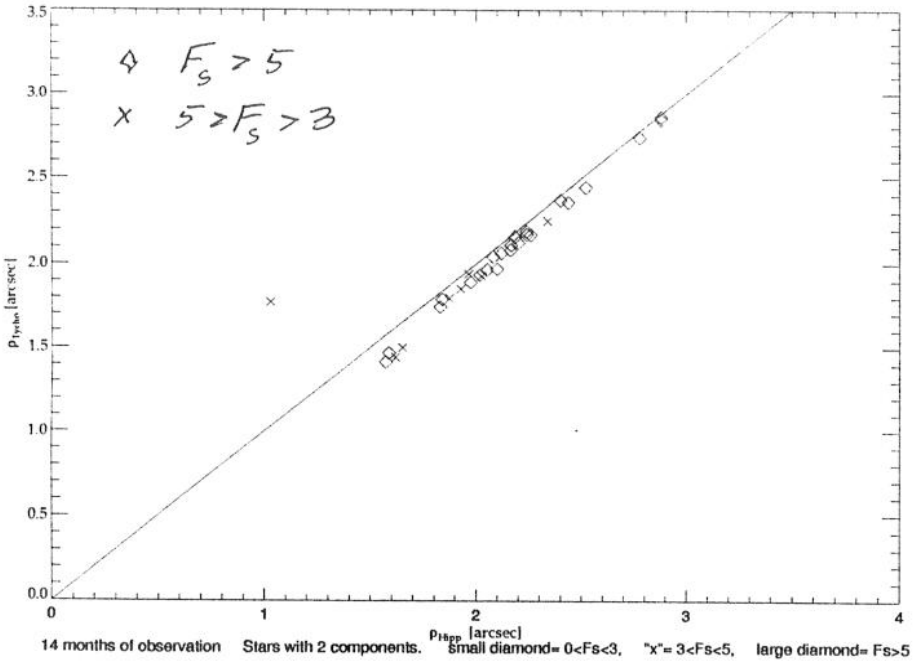
F_s = 3.7



6

Tycho double stars

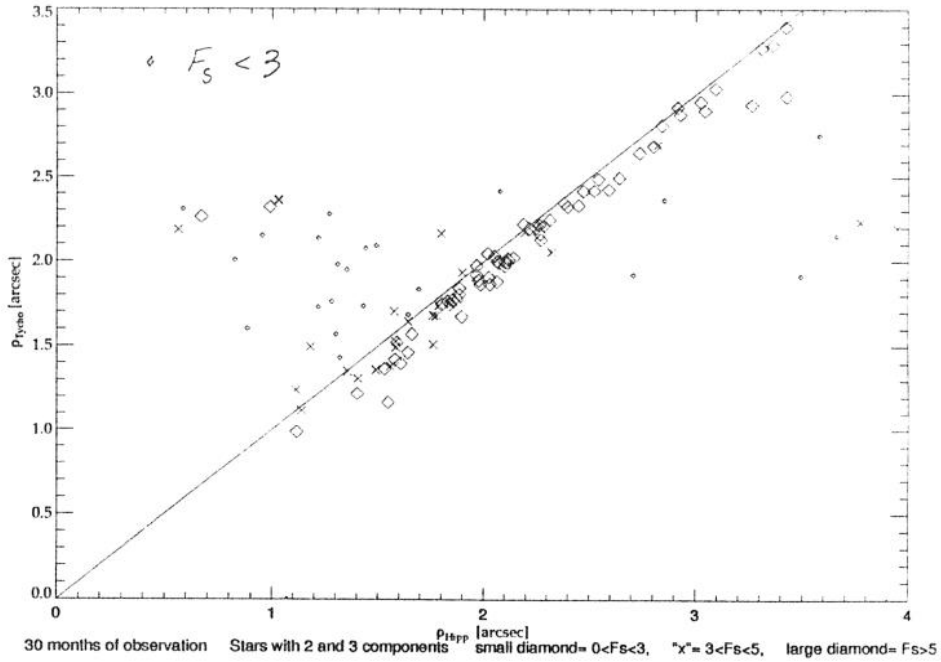
bright



all flagged known doubles, HIC, SS's first list

$\sim \frac{1}{10}$ of stars plotted (≡)

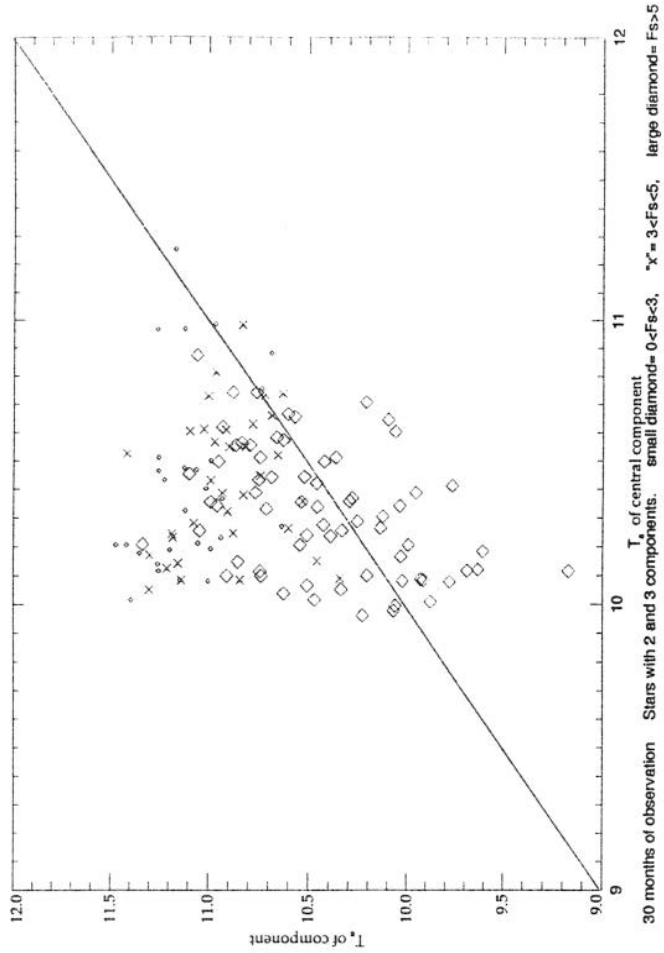
faint

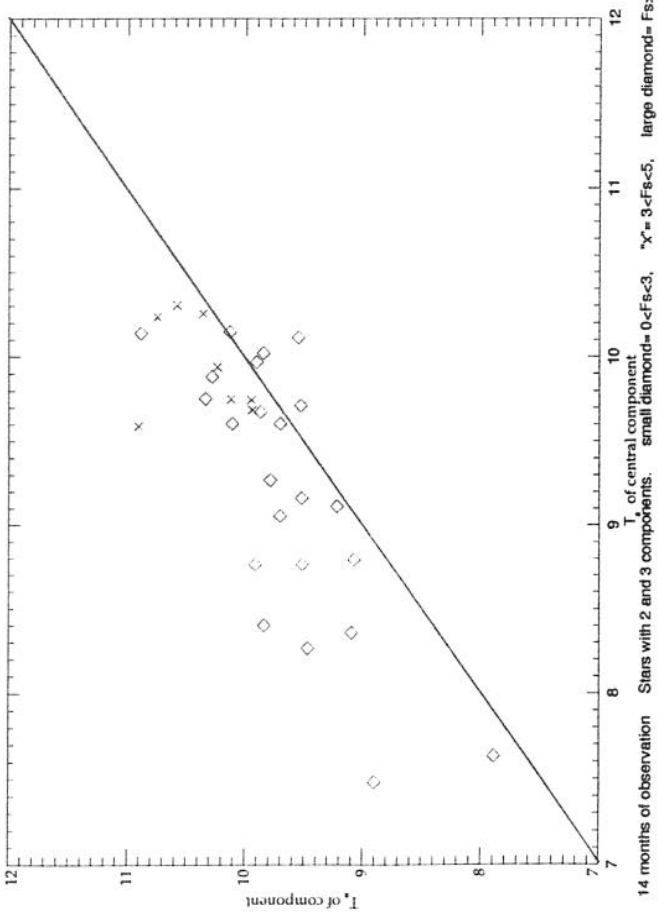


$T_{recogn} > 10$, HIC-stars, SS's 2nd list

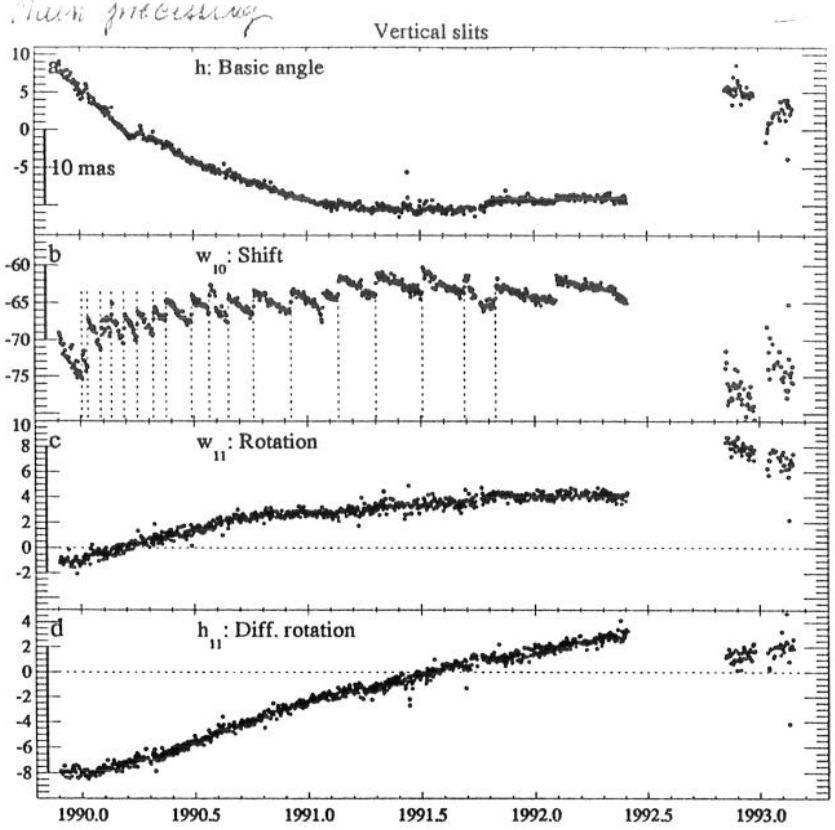
MP

10

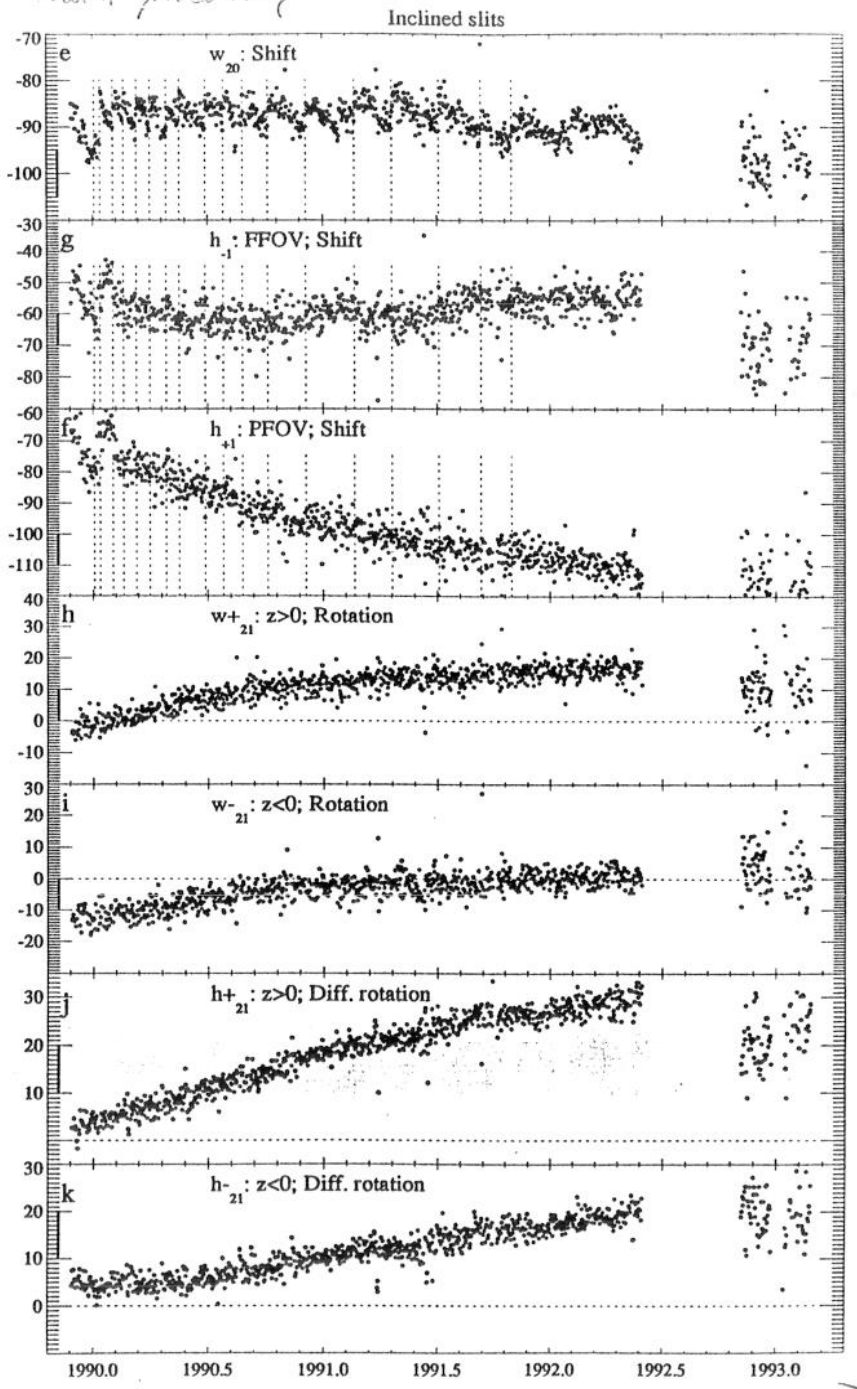

T, of component
T, of central component
30 months of observation Stars with 2 and 3 components. small diamond= 0<Fs<3, "x"= 3<Fs<5, large diamond= Fs>5


T, of component
T, of central component
14 months of observation Stars with 2 and 3 components. small diamond= 0<Fs<3, "x"= 3<Fs<5, large diamond= Fs>5

Main processing



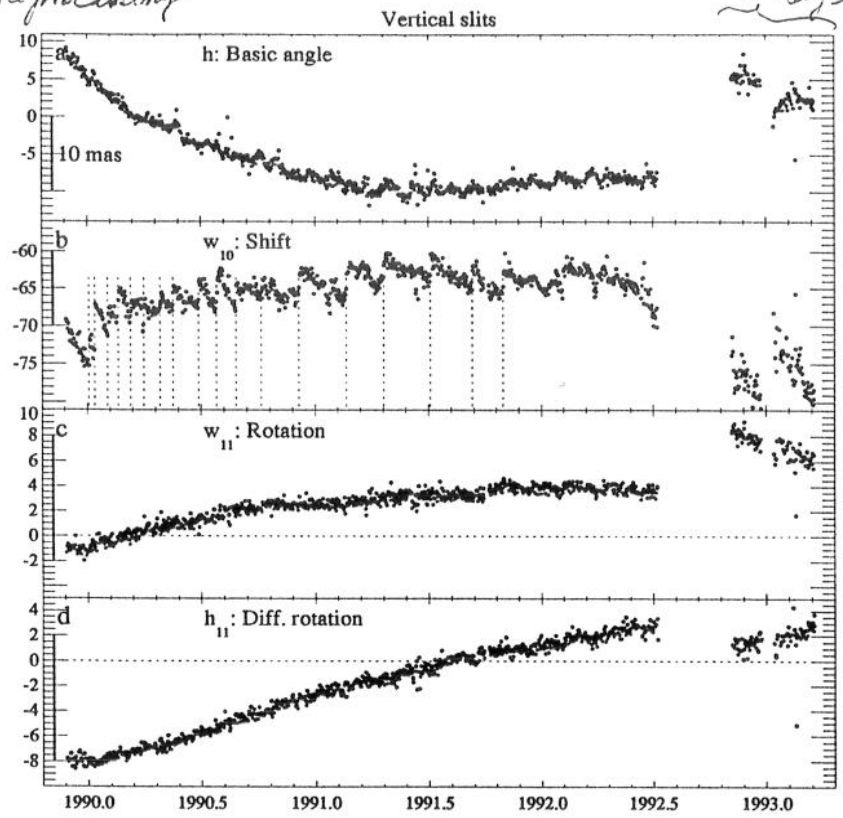
Main processing



17

Reprocessing

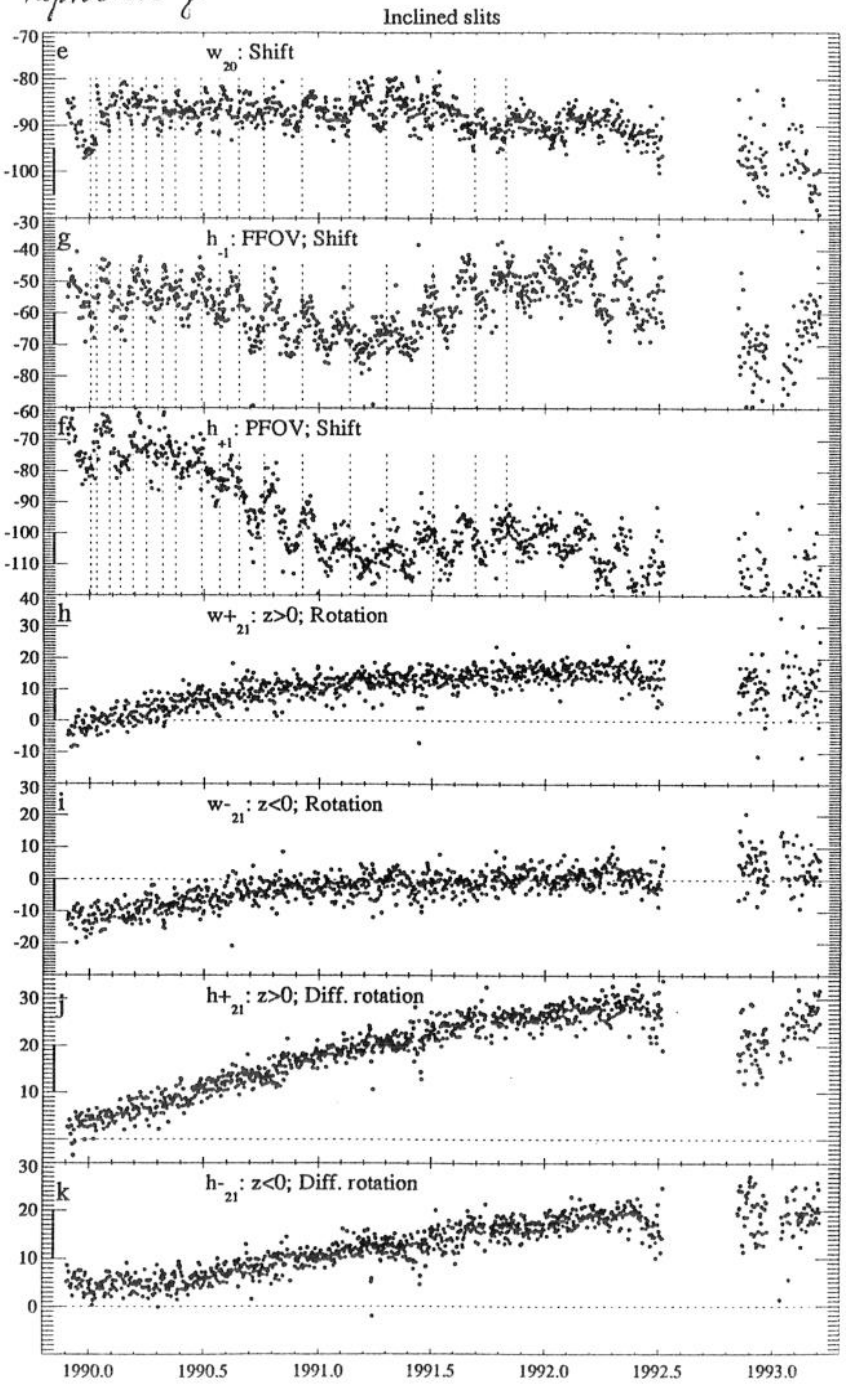
90 days



$w^{*}_{fz}(z) = \ldots + h_f$ for $z > 0$

$= \ldots - h_f$ $z < 0$

Reprocessing



oscill. but less scatter

A Second Tycho Processing

31 March 1995 – Issue #4

Abstract

A second processing of all Tycho data based on a photon superposition for the whole mission is discussed. The proposed processing would use the final TYC as part of an extended input catalogue of all the 5 million brightest stars on the sky. About 1.5 million stars could be added to the one million in TYC and the positions for the faintest several hundred thousands stars in TYC could be improved because the photons contained in the crossings giving $SNR < 1.5$ would not be lost as they are in the TDAC processing.

The resulting second Tycho catalogue, might be called 2T and would contain 2.5 million stars, ie. those in TYC and the new stars detected, to a limit of $V \simeq 12.0$mag. The positions would have standard errors less than 150 mas. A magnitude would be obtained for all new stars.

Proper motion for all the stars could be determined with a precision about 3 mas/yr by means of the first epoch positions in the Astrographic Catalogue. The 2T catalogue in the Hipparcos Reference system would constitute a denser reference frame than TYC and a source of proper motions for galactic studies.

NDAC "FINAL" SPHERE SOLUTION

ANNEX II

- 3RD GREAT-CIRCLE REDUCTION MADE JAN-FEBR '95
  ⇒ SPHERE SOLUTION N37.02 READY BY 1 MARCH
  BUT: N37.02 WORSE THAN N37.01 (OCT '94)!

- REVISED 3RD G.C.R. (READY ~ 20 MARCH):
  2326 ORBITS (#1 - 2768)
  3570808 ABSC. ON 111825 STARS
  3101 " " MINOR PLANETS

- PRE-ANALYSIS OF ABSCISSAE W.R.T. N37.01:
  ⇒ CHROMATICITY, 6TH HARMONIC, SKEWNESS, σ_{ATT}

- PRELIMINARY SPHERE SOLUTION (RUN 336):
  ⇒ EMPIRICAL CORRECTION OF σ_{ABSC} VS. Hp

- "FINAL" SPHERE SOLUTION (RUN 354-356): (1.9% obs. rej)

PRIMARY STARS	73116
SECONDARY "	38376
TOTAL SOLVED:	111492
LARGE χ^2 :	2099
A PRIORI EXCL. :	6459*
MAXIMUM POSSIBLE =	120050

← N37.03 EPOCH 1991.25

⇒ DS-ANALYSIS
(* SOME EMPTY HIC#'s)

- AD-HOC CATALOGUE OF N37.03 + DS-DATA FOR COMPARISON WITH F37i (AND RFWG?):

FROM SPHERE SOL:	105464
FROM DS (PC):	2236
FROM DS (PR):	8330
TOTAL ENTRIES:	116030

← N37.04

ANNEX III

FAST REPORT

SECOND (LAST) 37 month ITERATION

ALL ATTITUDE + CERCLE REDUCTION RE-RUN

- SOFTWARE MODIFICATIONS FOR CIRCLE REDUCTION
  - MODELLING OF CRACKS
  - PROBLEM STARS PREVIOUSLY DETECTED → PASSIVE
  - MAXIMIZING THE NUMBER OF ACTIVE STARS.
  - CASE BY CASE CALIBRATION UNKNOWNS SELECTION
  - POSSIBILITY OF $\dot{T}$ AND $\dot{T}^2$ TERMS IN BASIC ANGLE

- CALIBRATION
  - 3rd, 4th γ FROZEN FROM PREVIOUS SOLUTION
  - OTHER TERMS REDETERMINED UNLESS OTHERWISE STATED
    - T and T^2 AT JUMPS IN δ
    - T AROUND JUMPS IN ν TERMS
    - COLOUR TERM GENERALLY RE-DETERMINED
    - SECOND ORDER SKIPPER IN SMOOTHING RGC's AS WELL AS δ

- OTHER TUNING
  - REJECTION OF SOME ILL DETERMINED ATTITUDE INTERVALS
  - REMOVAL OF STARS FROM ACTIVE STAR LIST
    - ALL RGCs IN SMOOTHING MODE
    - ALMOST ALL FISHER TESTS $1 \pm 0,008$

FUTURE ACTIVITIES

150 - 200 RGCs TO BE RE-RUN

- ATTITUDE PROBLEMS
- LEFT OVER BAD ACTIVE STARS
- REFINING THE CALIBRATION UNKNOWNS.

SPHERE SOLUTION

- ARI SOFTWARE FOR NON-LINEAR MOTION OF THE FAINT COMPANION.
- INCLUSION OF A CATALOGUE OF DOUBLE STARS
- EXPECTED ~ 112 000 STARS
- LIGHT BENDING

FOR FAST MEETING. MAY 15.

FAST PLANNING

- ASTROMETRY : LAST ITERATION

RGC solution

⇨ Mass processing 31 March 95
⇨ Fine tuning 15 April 95

Sphere Solution

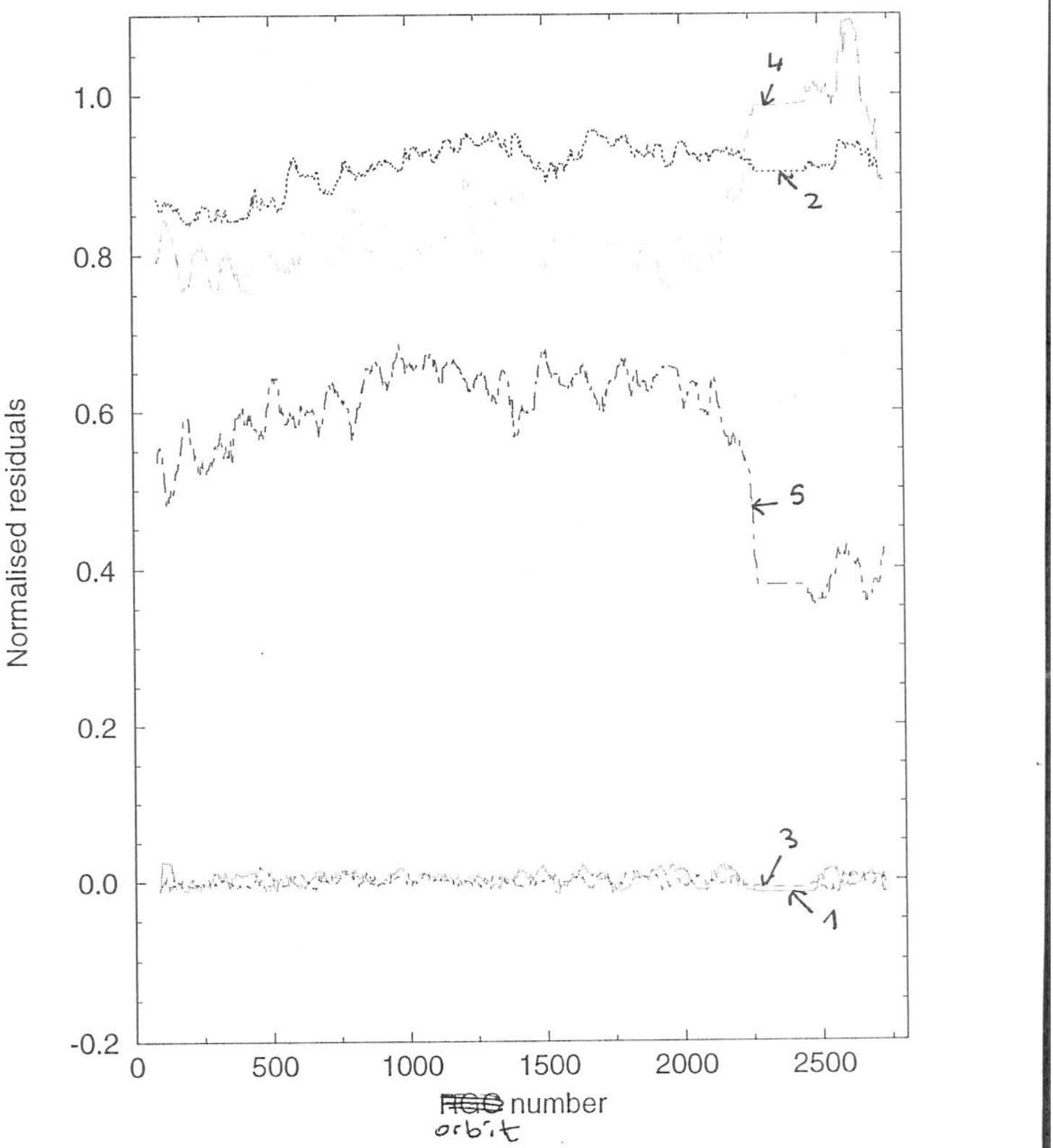
⇨ System definition 20 April 95
⇨ Astrometric parameters 30 April 95 (~ 116000 stars)
⇨ New file for the merging First week of May

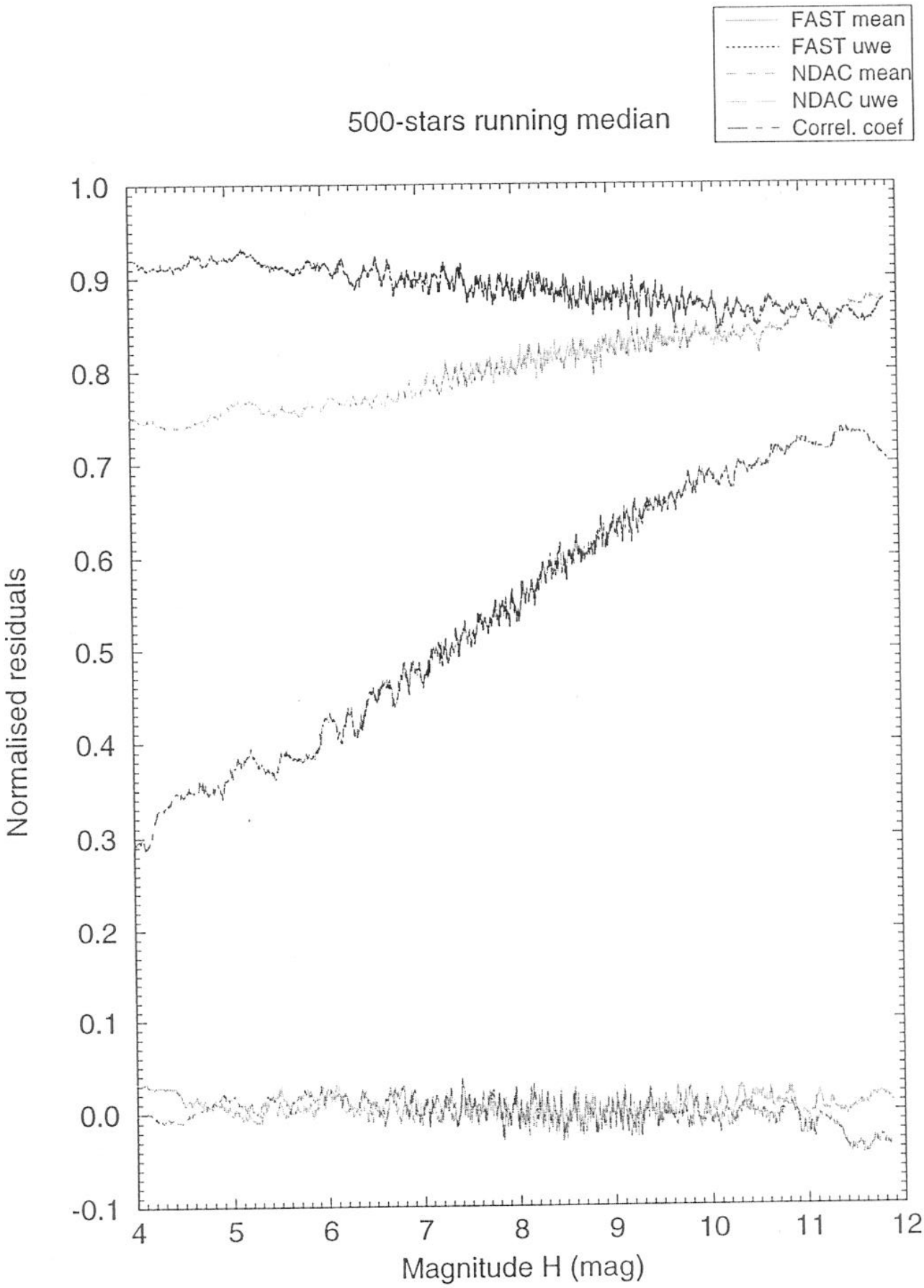
\+ Problem stars : May or June 95

ANNEX IV

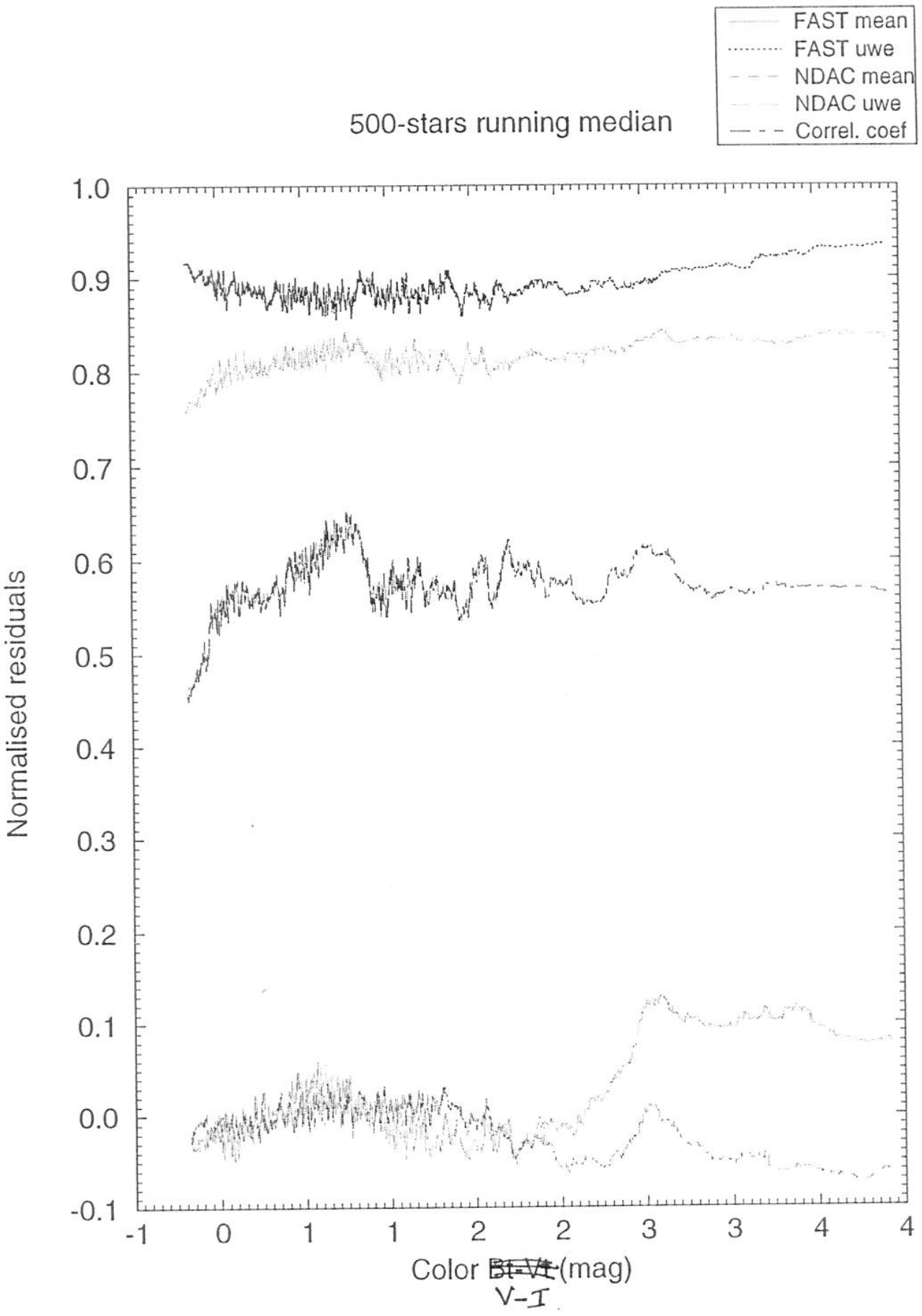
unit. weight error = RMS (normalised residuals)

Variation with time

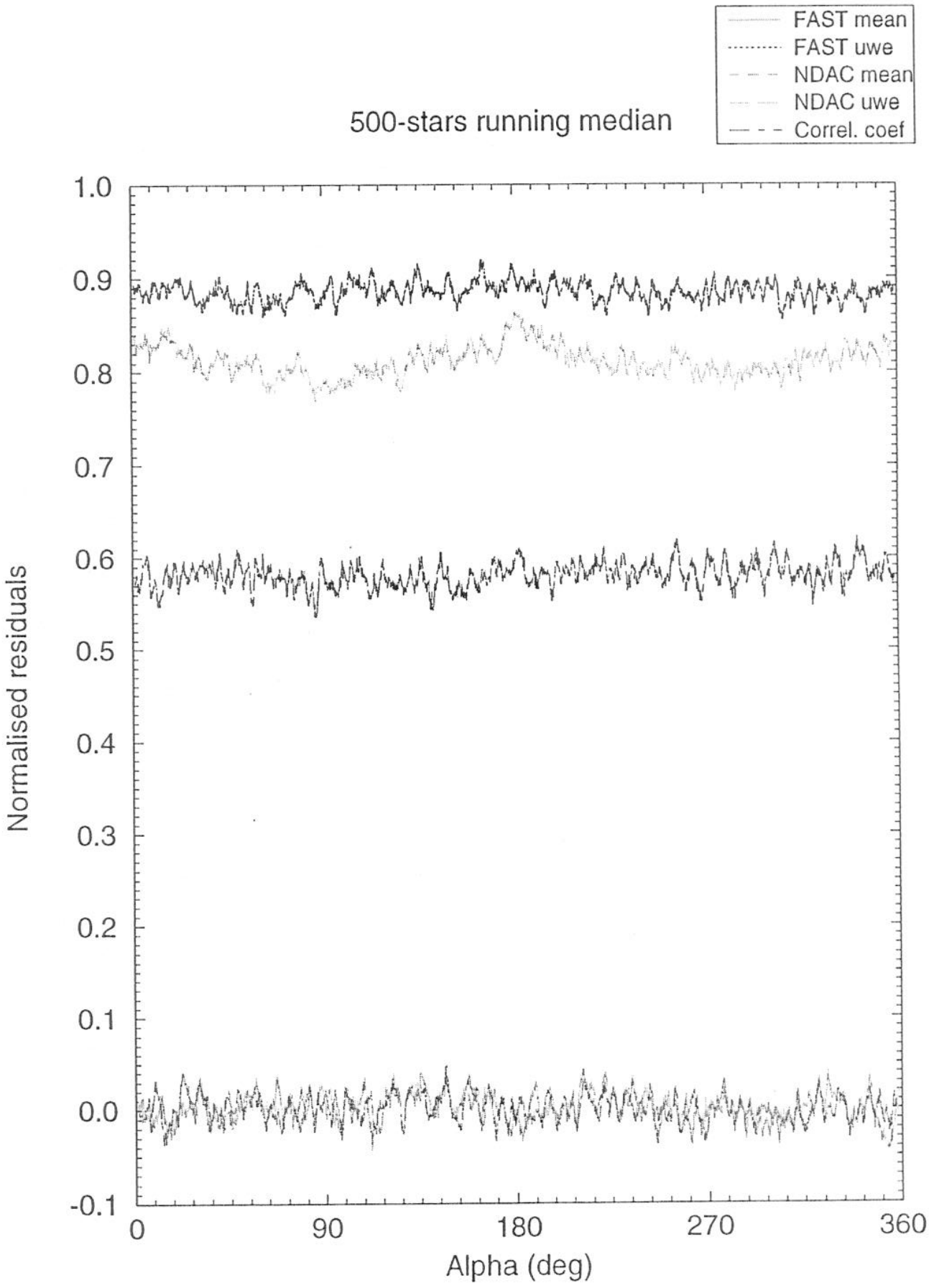




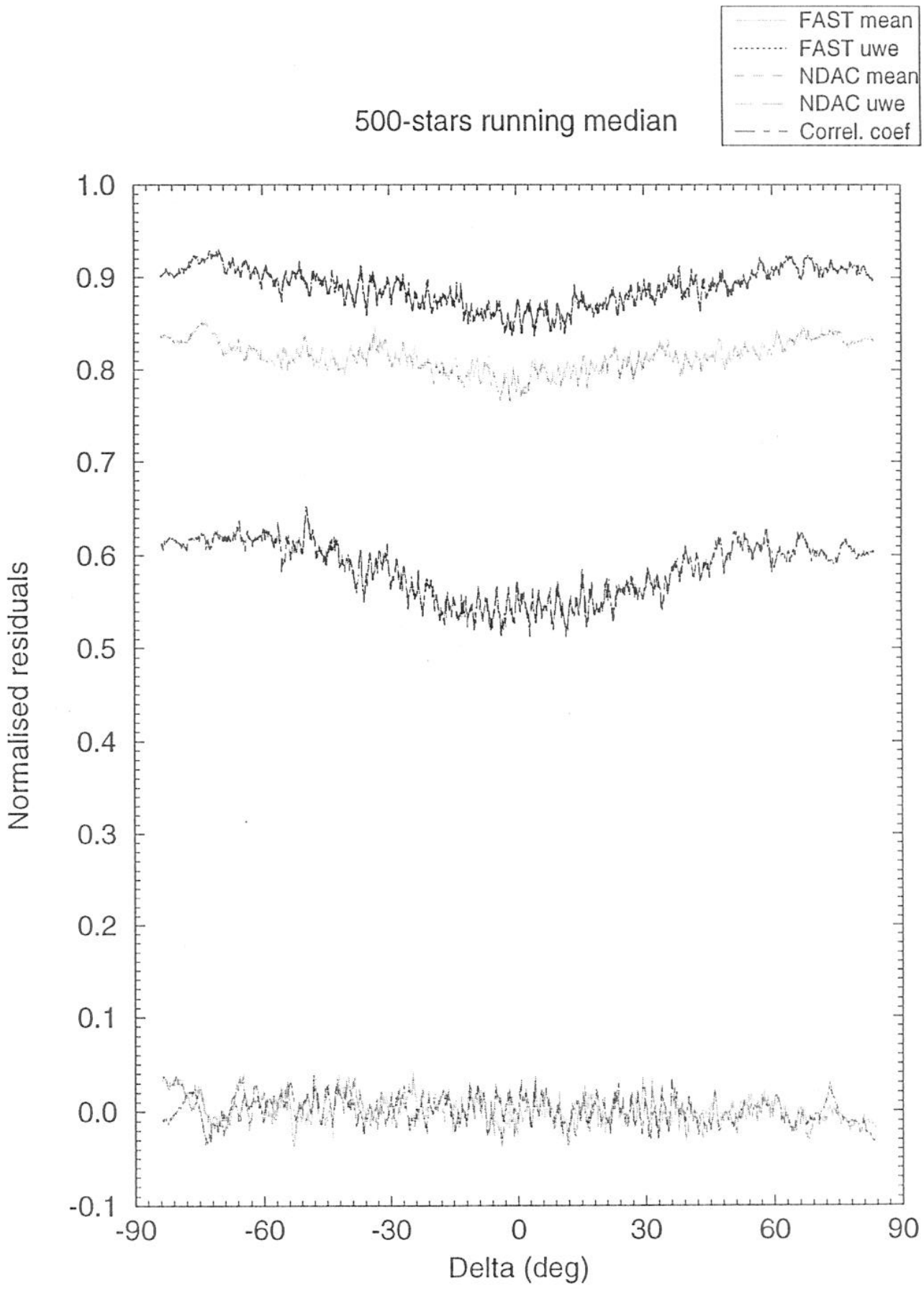
1 Mar 95 at 22:42



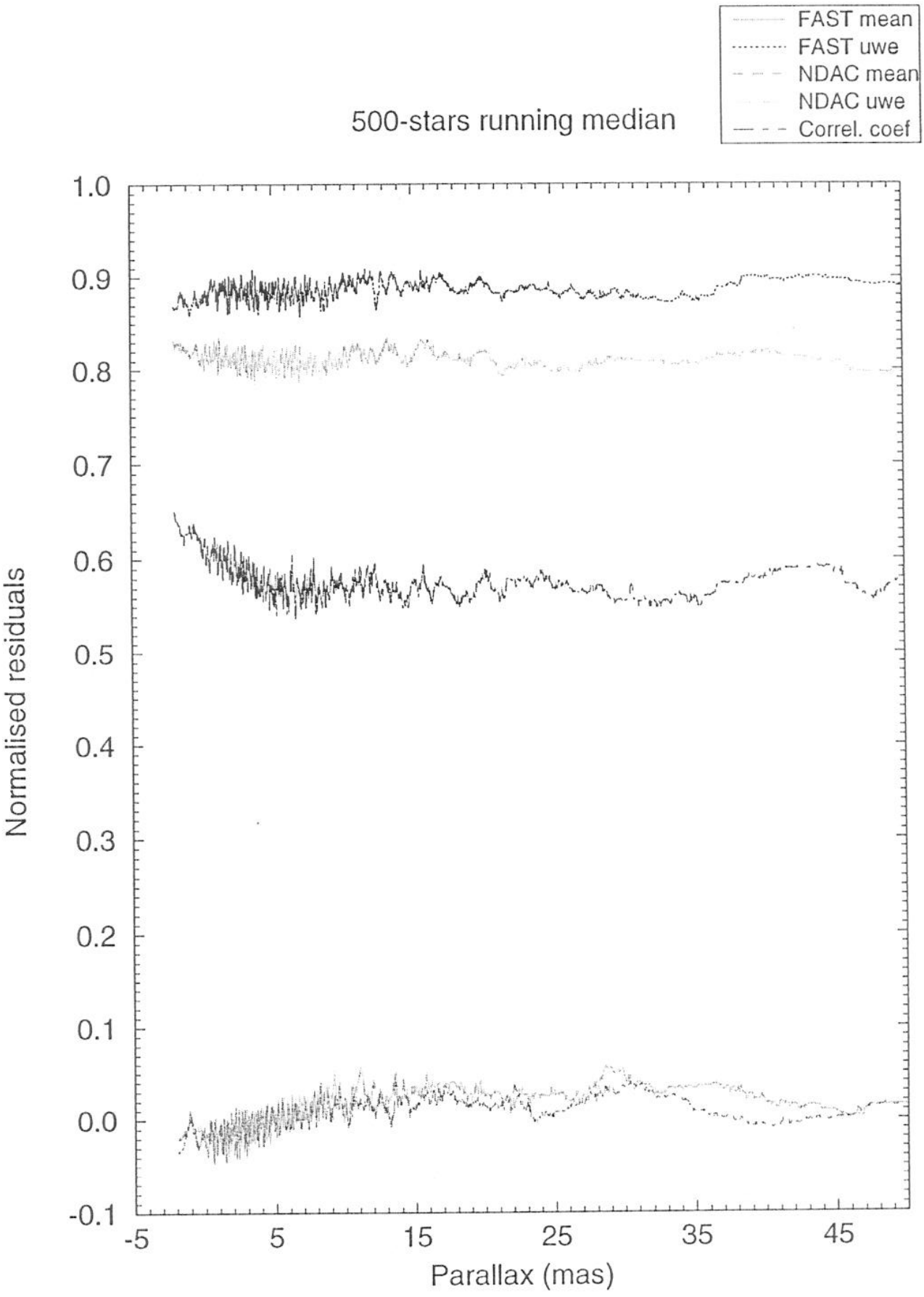
1 Mar 95 at 22:42



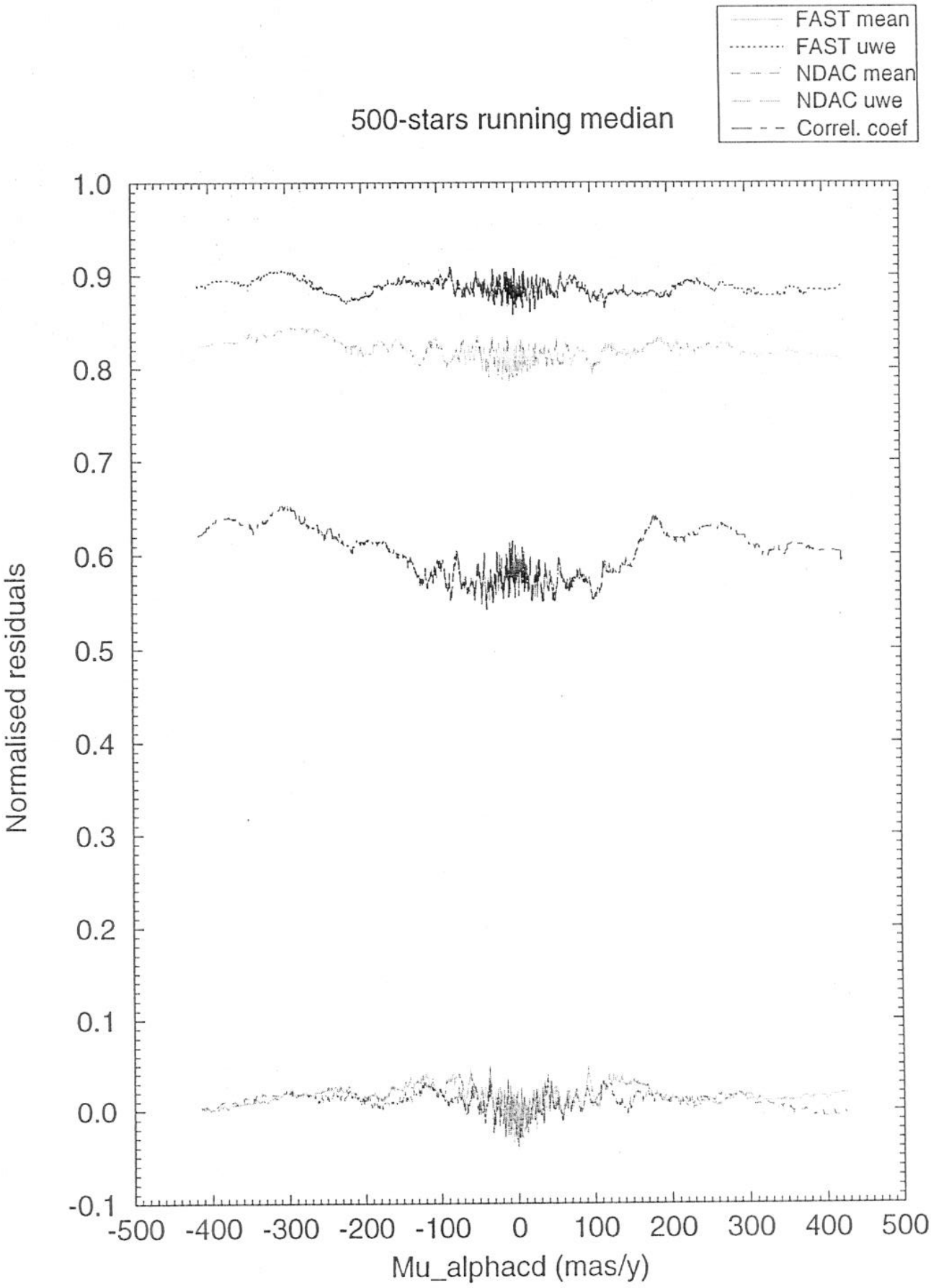
1 Mar 95 at 22:42



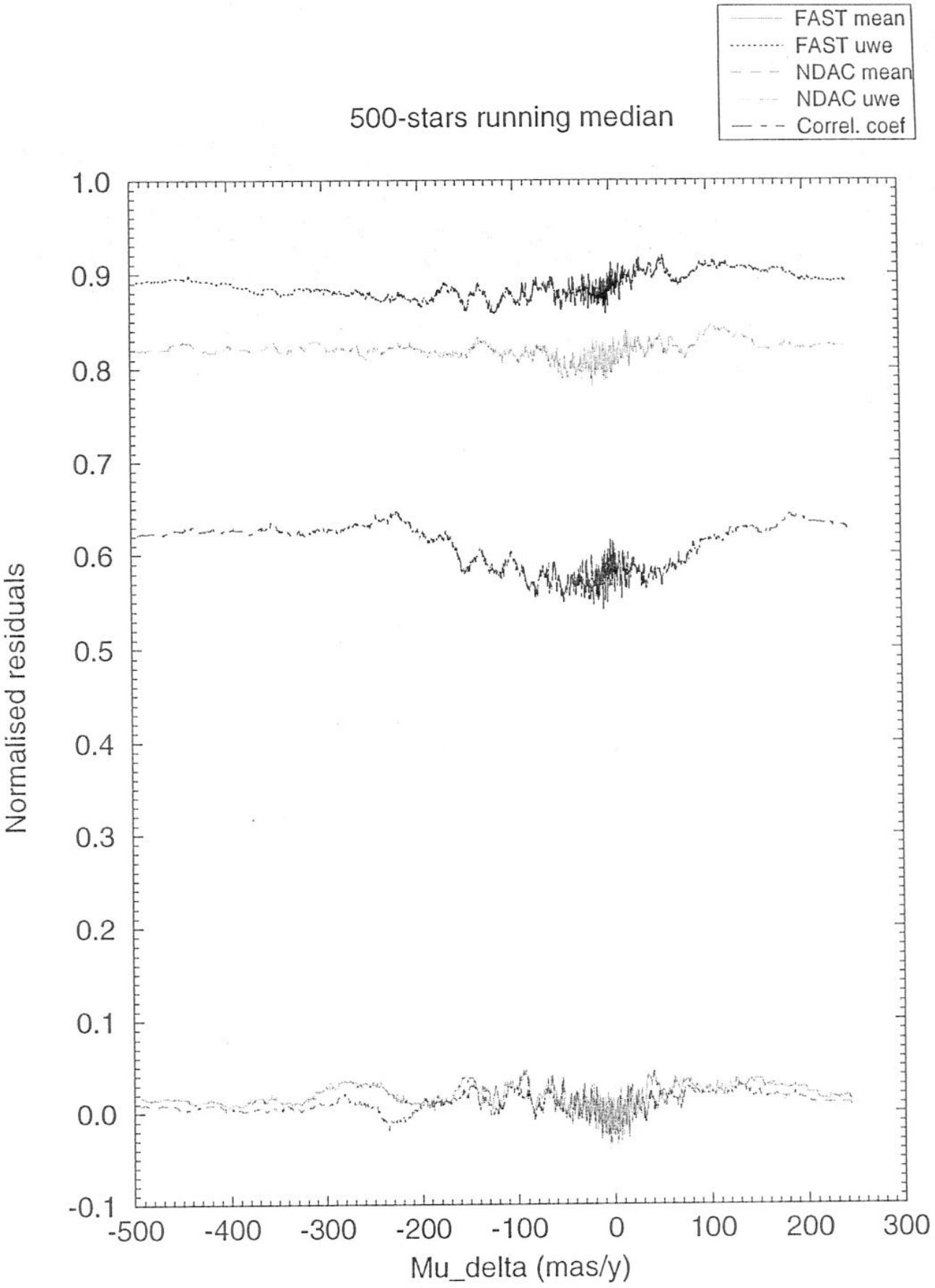
1 Mar 95 at 22:42



1 Mar 95 at 22:42



1 Mar 95 at 22:42



1 Mar 95 at 22:42

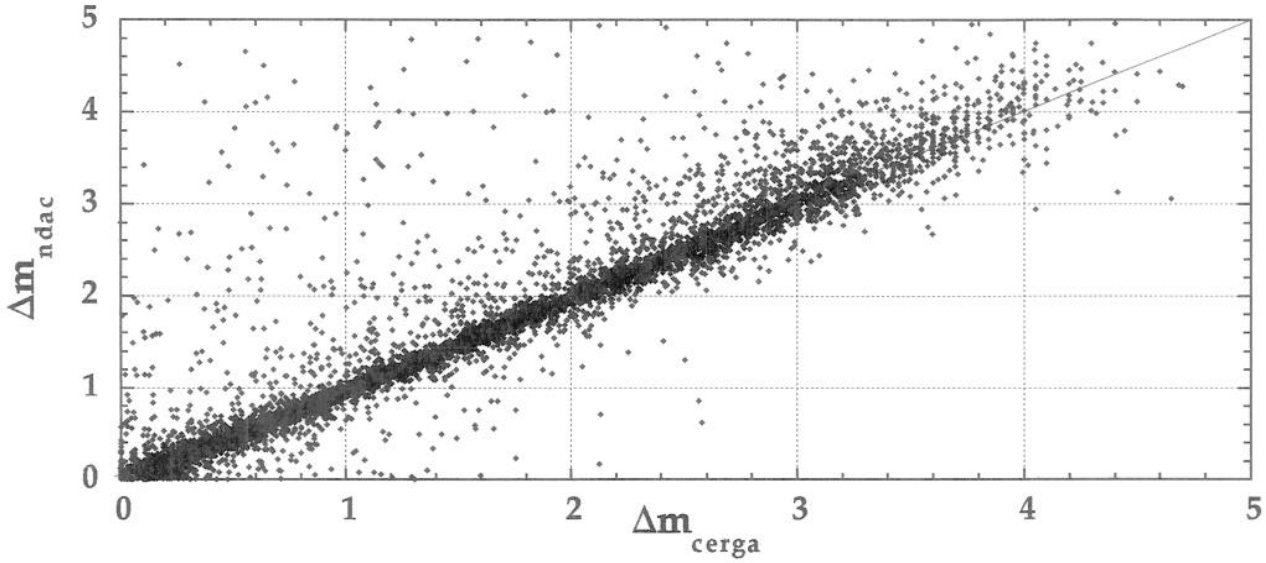
DSWG REPORT

- Italian solution available well in schedule
  - ⇨ 11500 stars

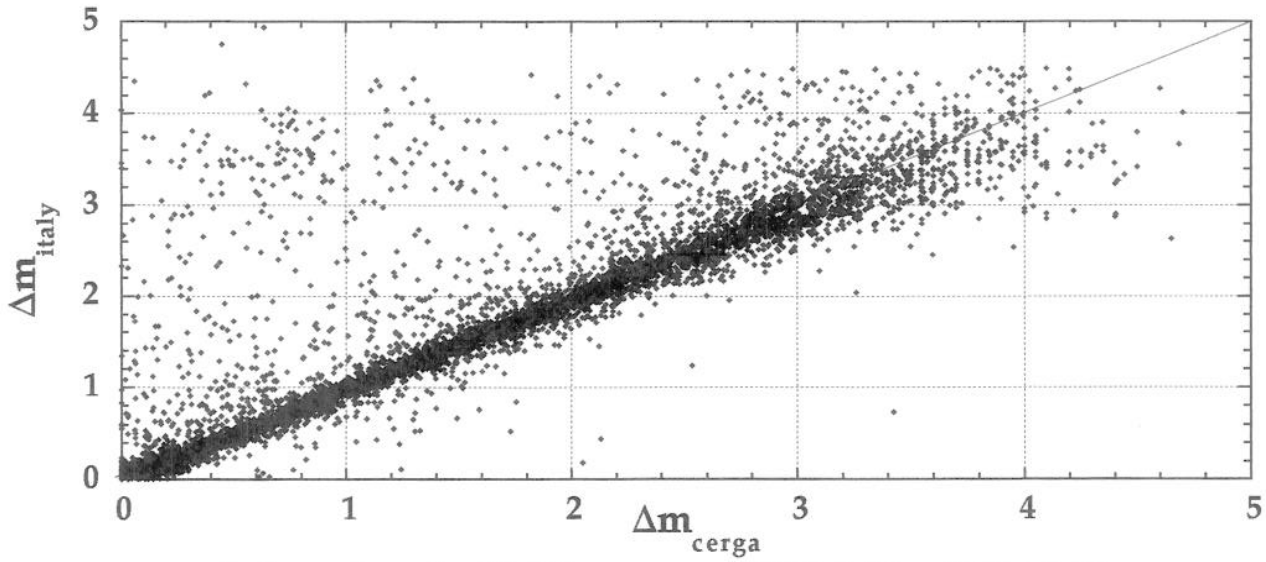
    8500 known - 3000 new
  - ⇨ Astrometric and photometric solution
- Work in Bruxelles :
  - ⇨ Identification of pseudo-new DS
  - ⇨ Computation of the new CCDM
  - ⇨ Few (~100) misidentifications in FAST solution
- Work in Heidelberg and Grasse :
  - ⇨ Astrometric binaries

ANNEX V

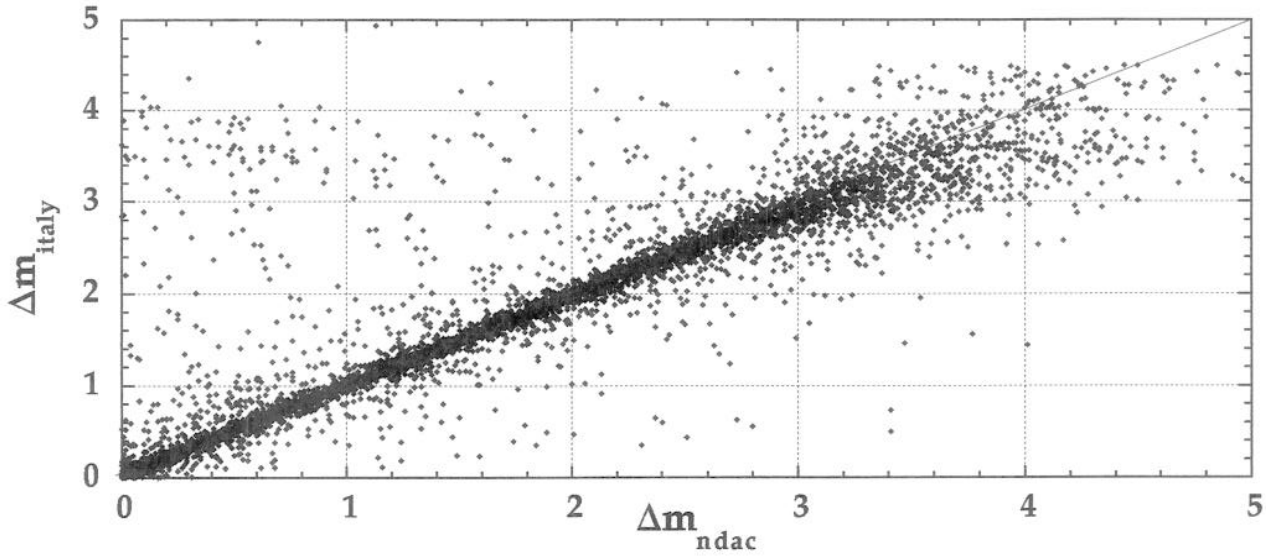
Magnitude Difference NDAC - CERGA



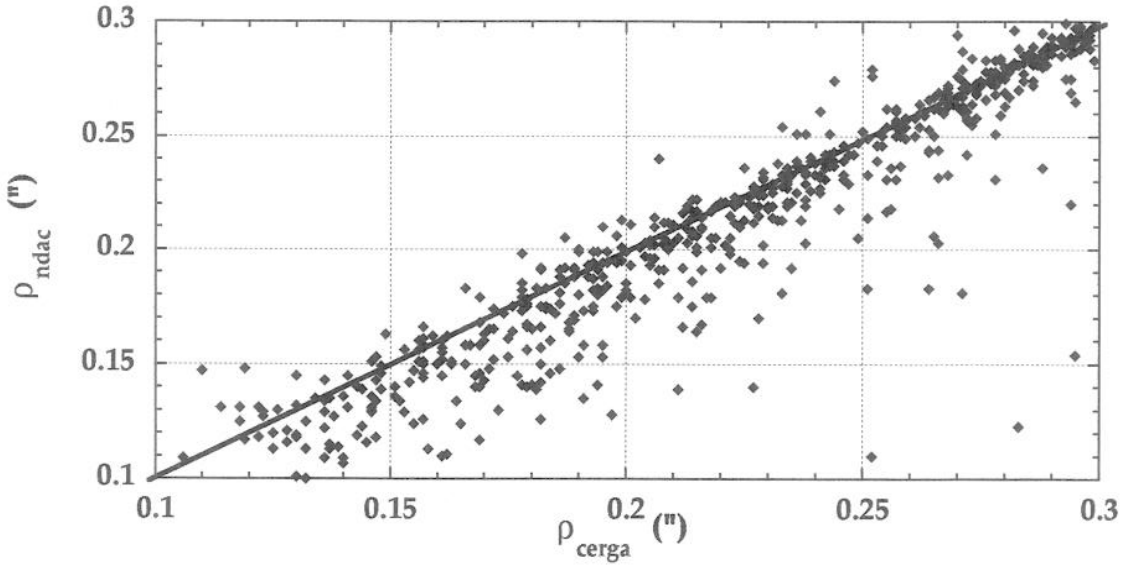
Magnitude Difference ITALY - CERGA



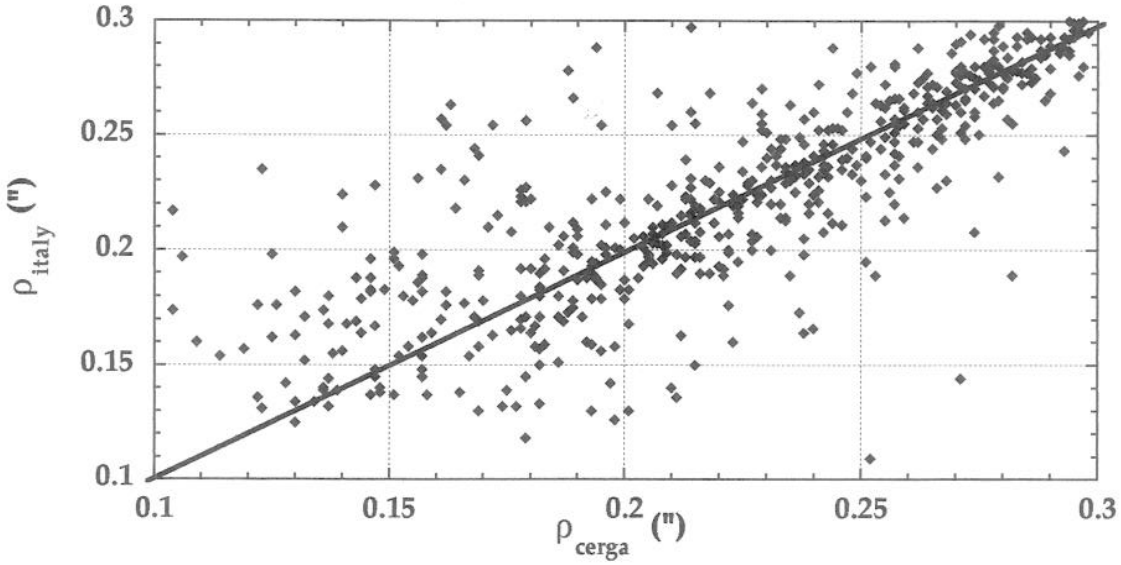
Magnitude Difference ITALY - NDAC



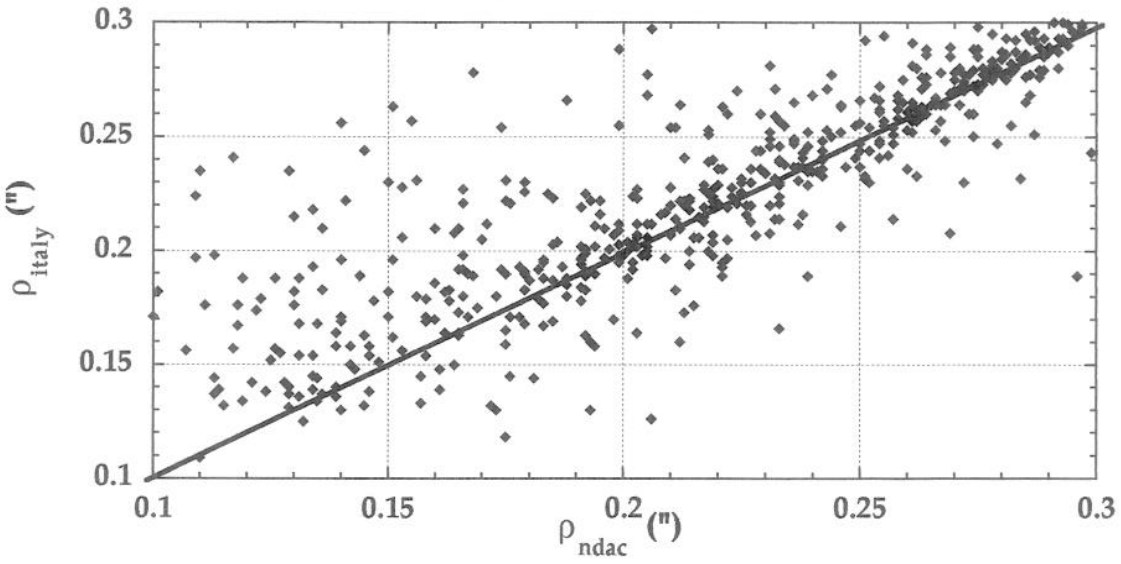
Close Binary Stars : NDAC / CERGA



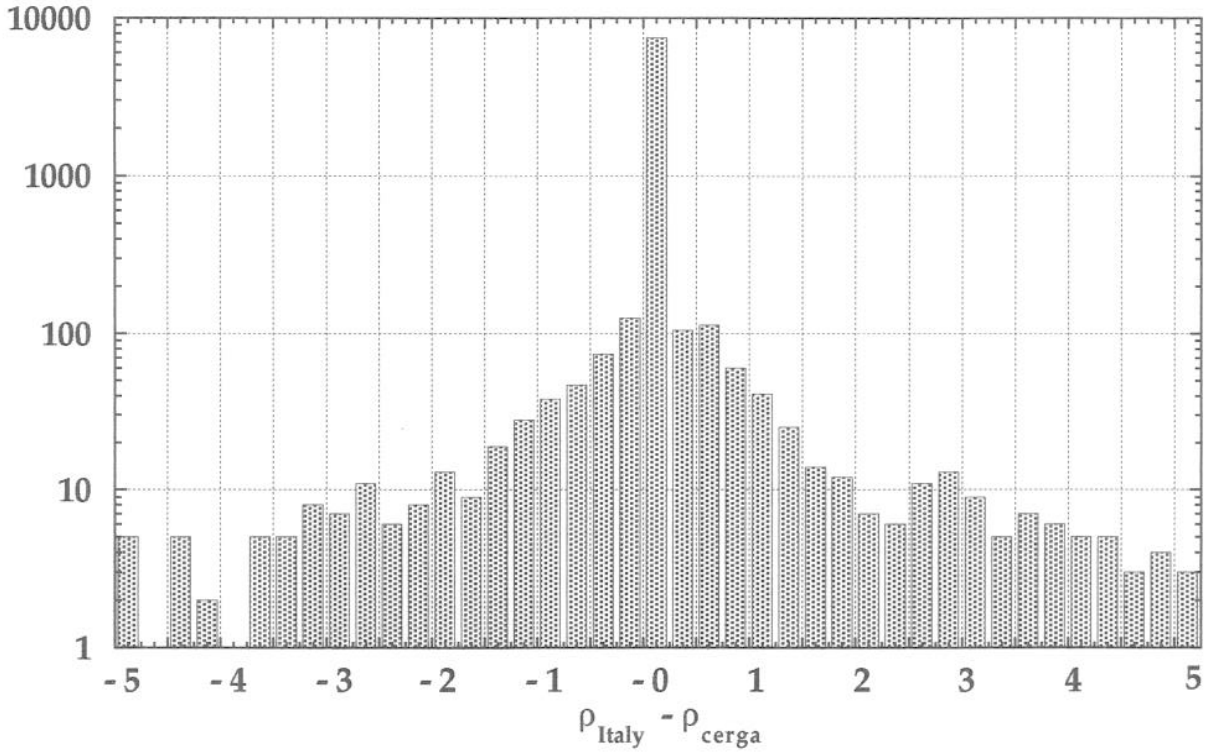
Close Binary Stars : ITALY / CERGA

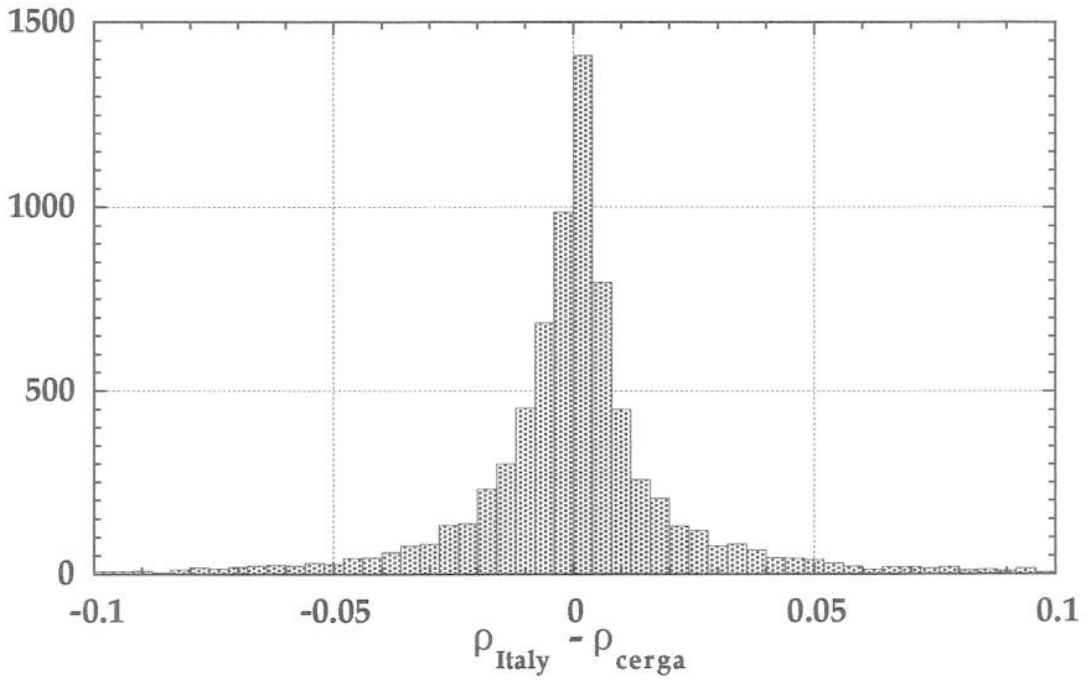


Close Binary Stars : ITALY / NDAC

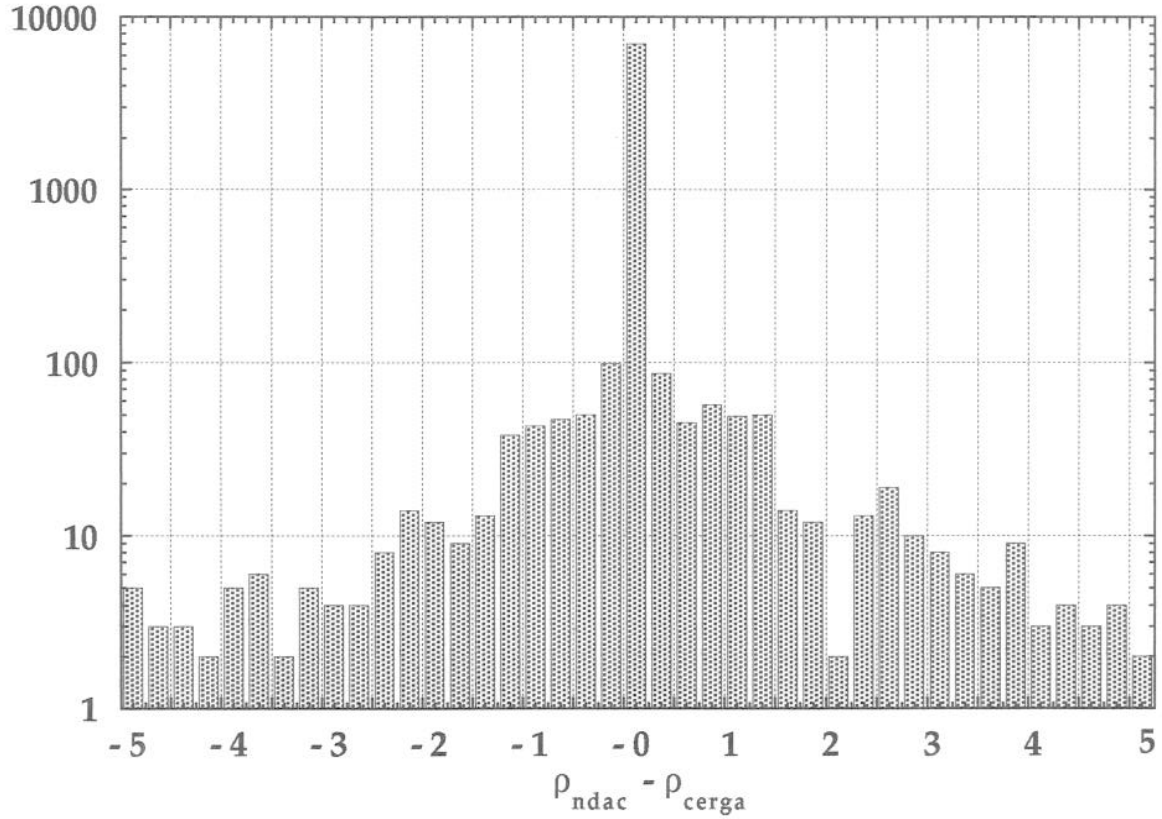


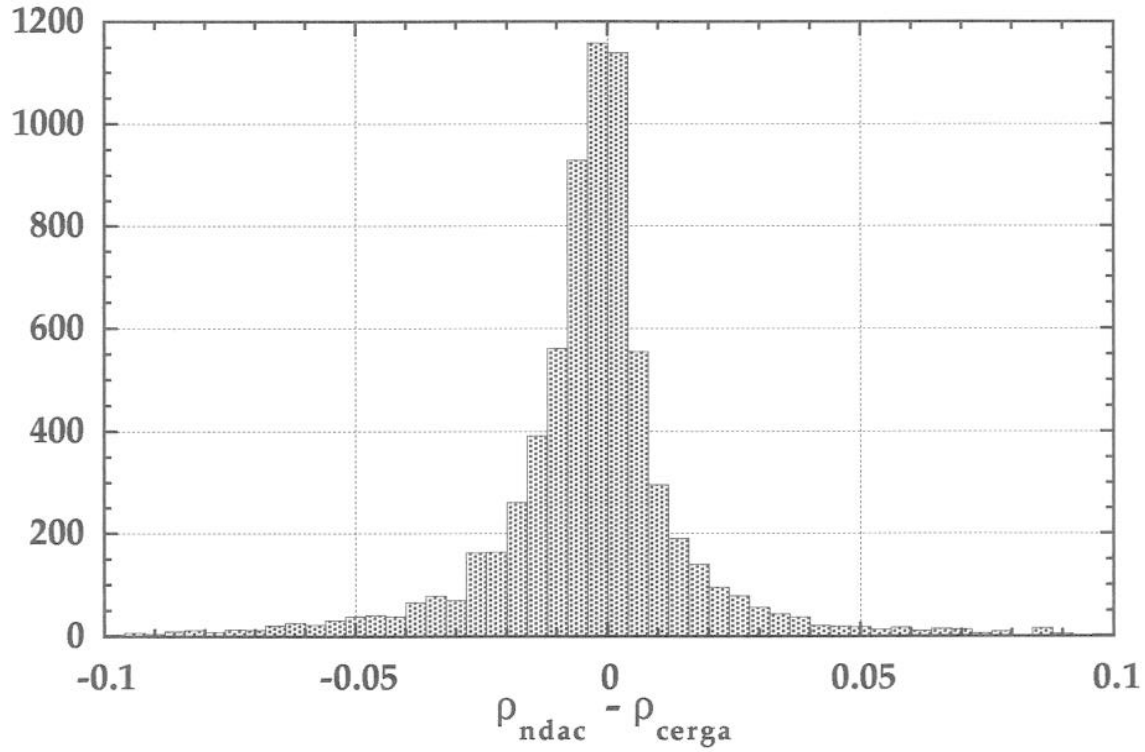
DS SEPARATION ITALY - CERGA

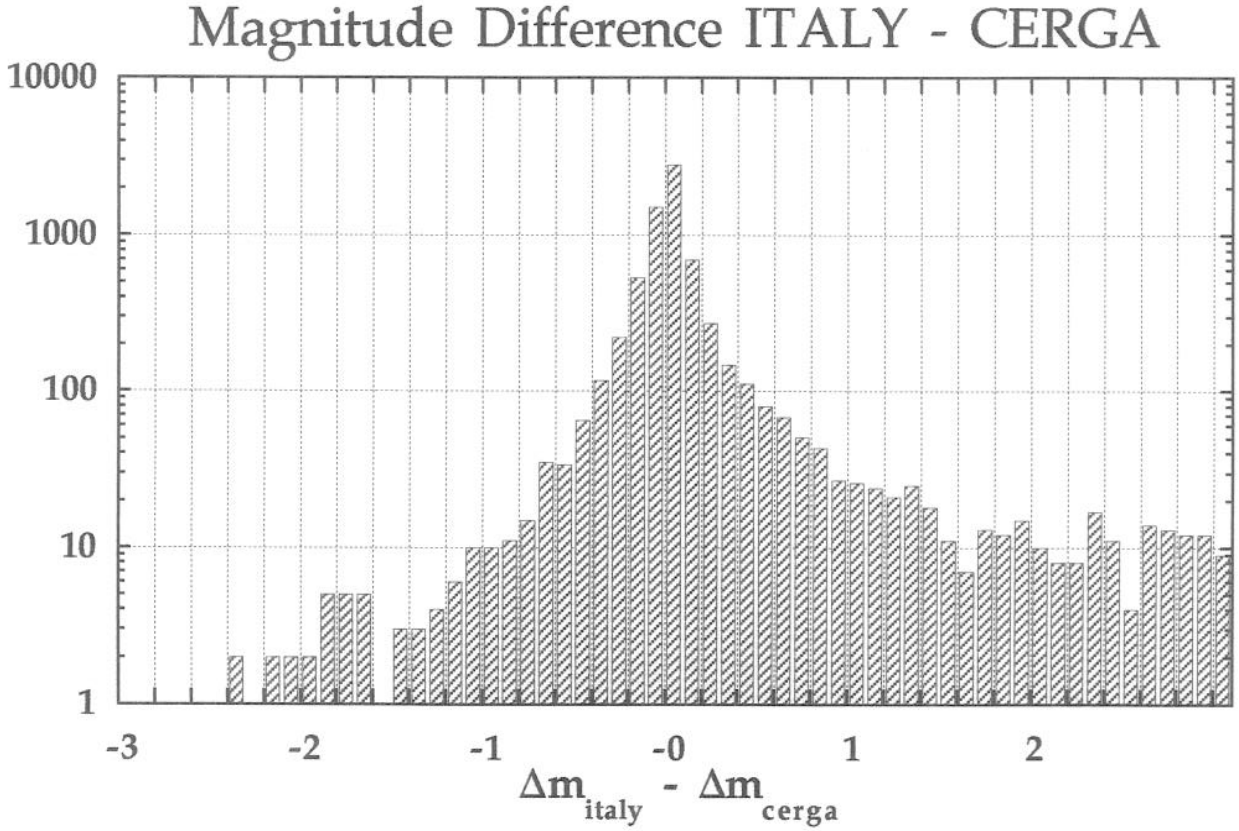


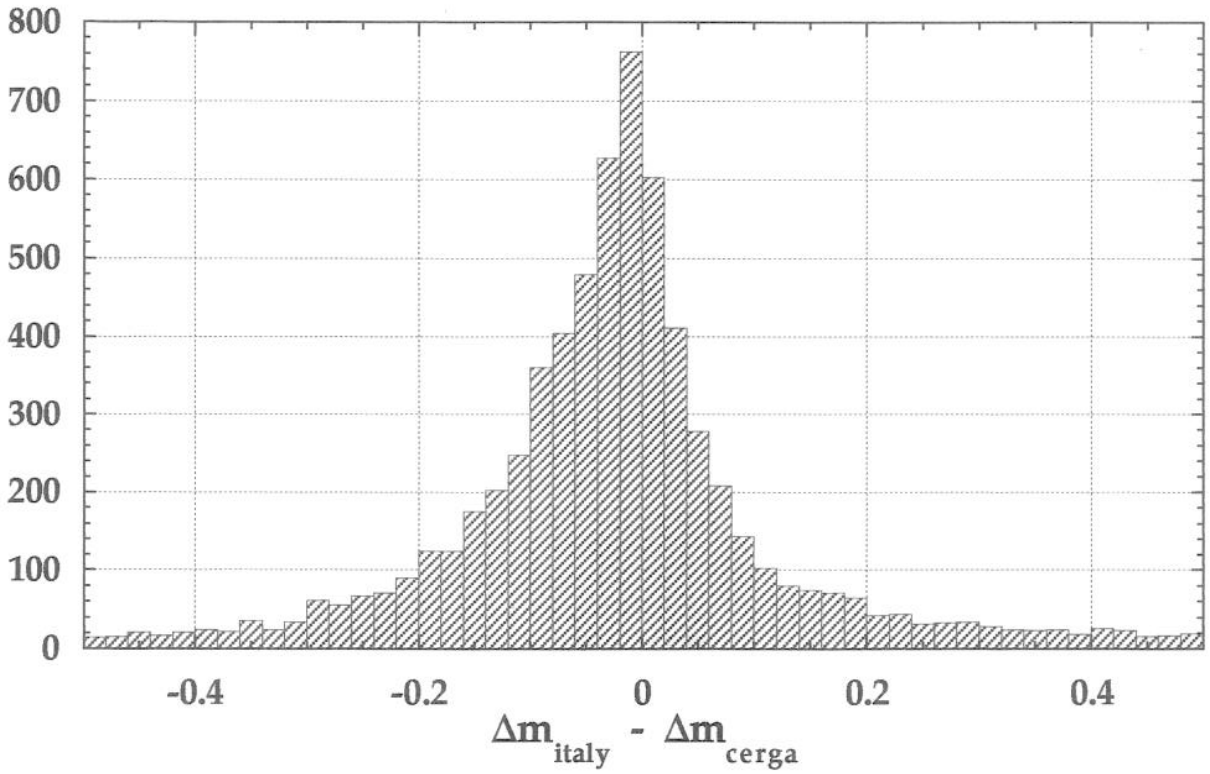


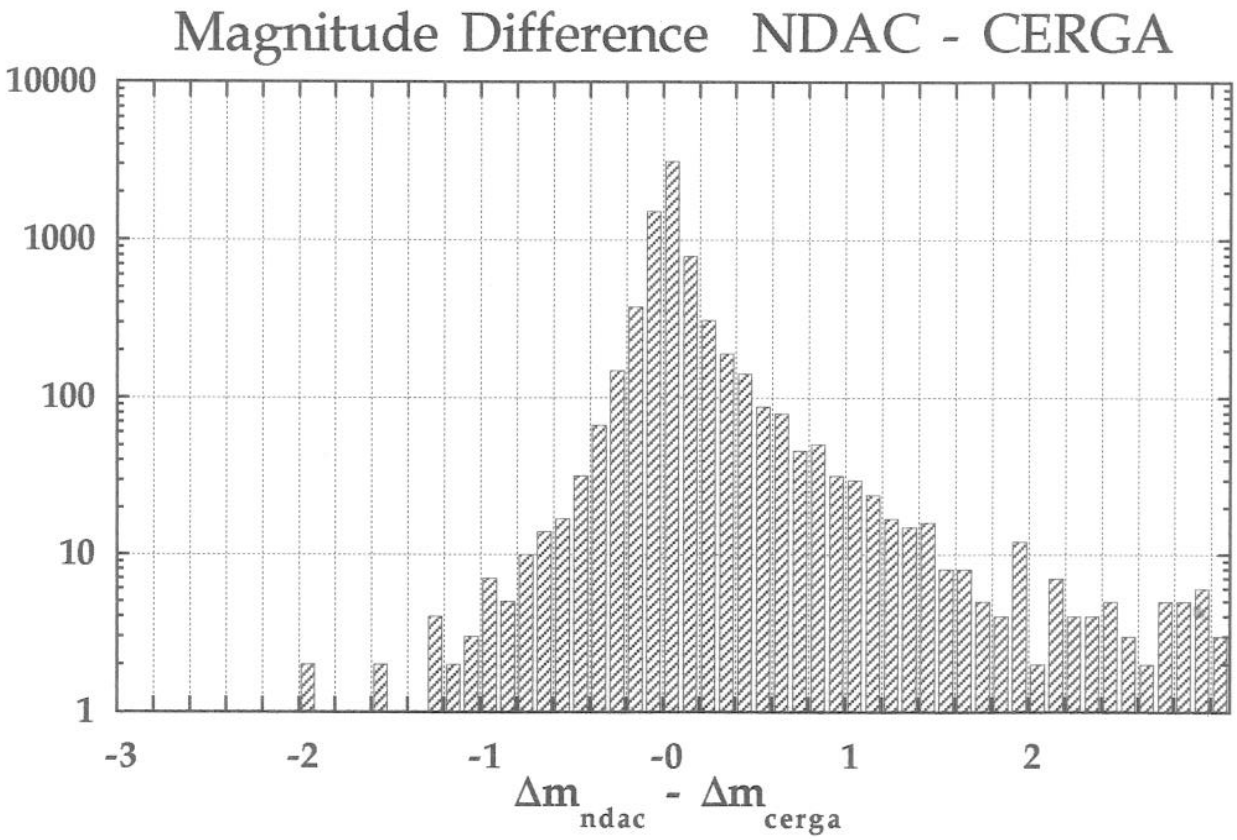
DS SEPARATION NDAC - CERGA

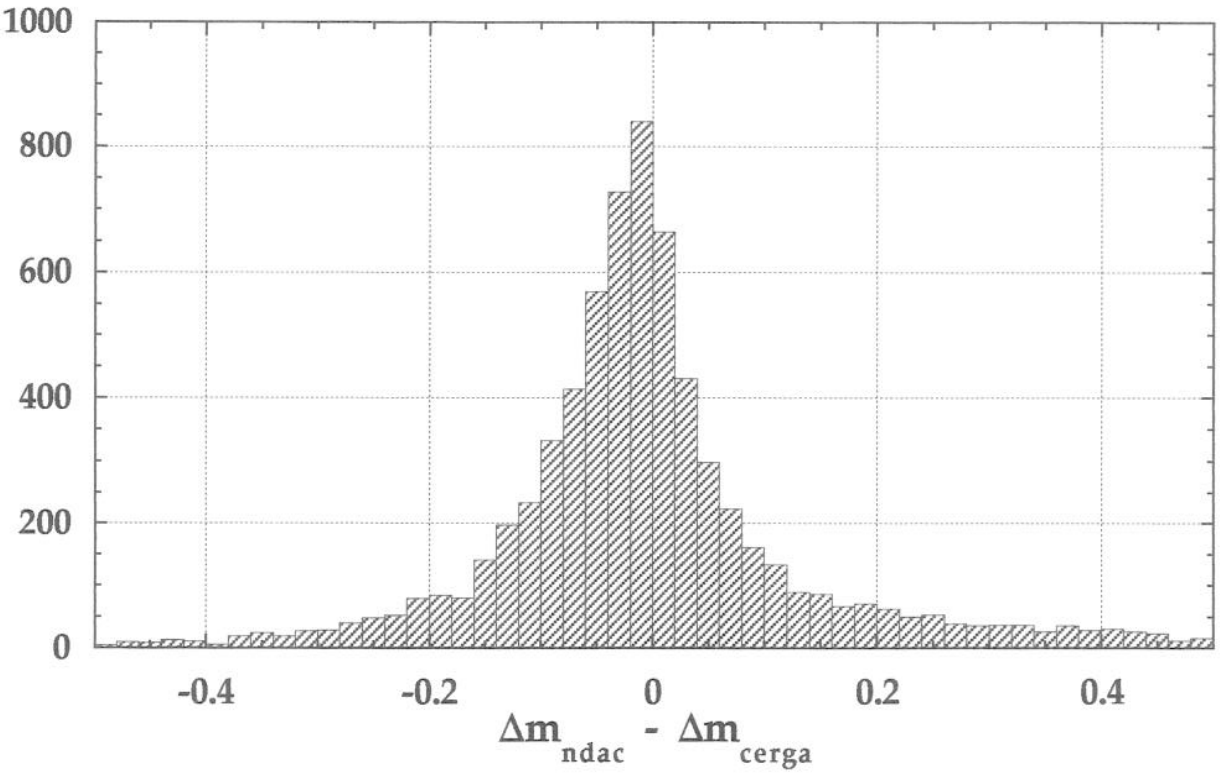




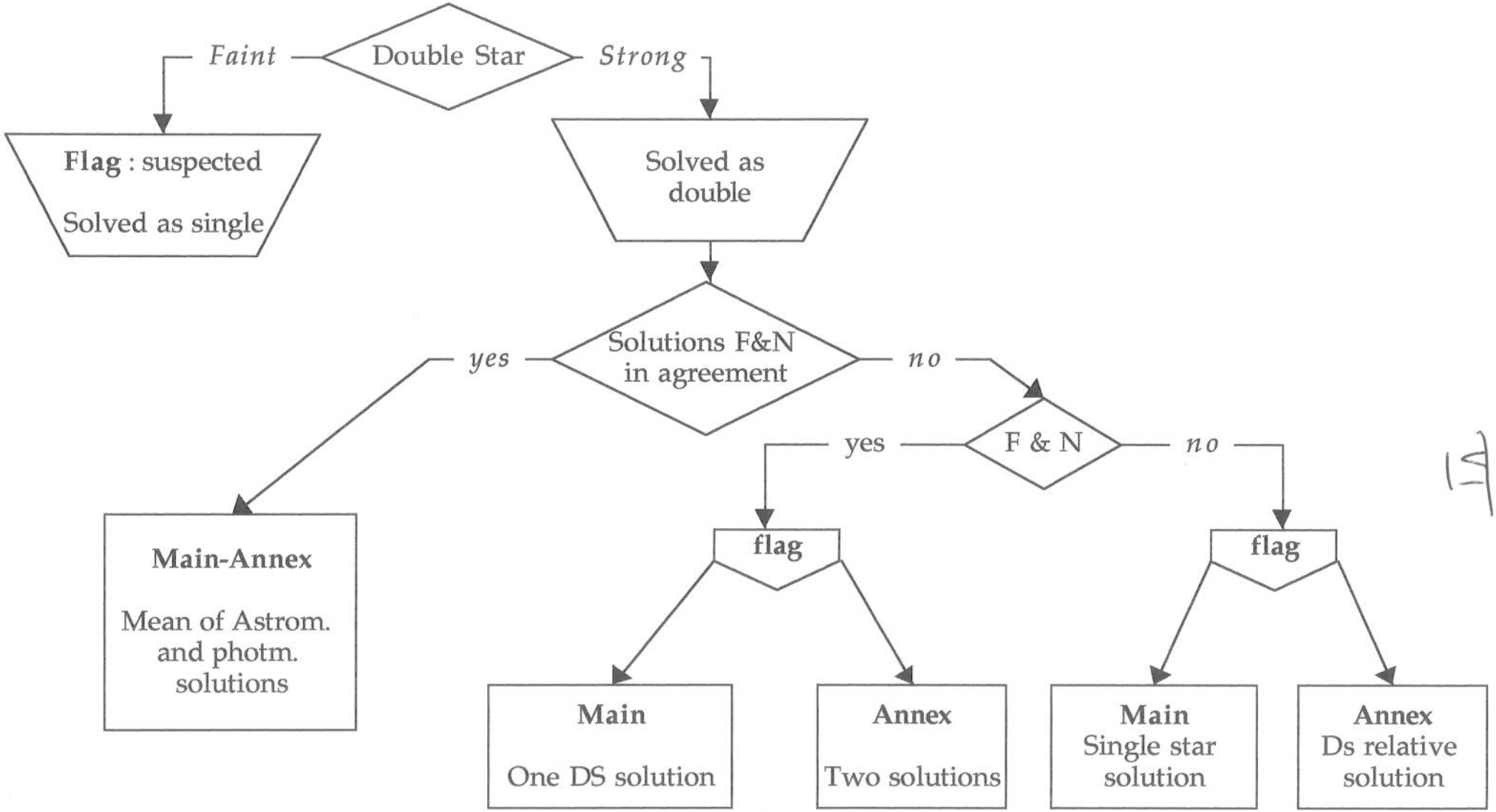

Magnitude Difference ITALY - CERGA
10000
1000
100
10
1
-3
-2
-1
-0
1
2
Δm italy - Δm cerga


800
700
600
500
400
300
200
100
0
-0.4
-0.2
0
0.2
0.4
Δm italy - Δm cerga


Magnitude Difference NDAC - CERGA
10000
1000
100
10
1
-3
-2
-1
-0
1
2
Δm ndac - Δm cerga


1000
800
600
400
200
0
-0.4
-0.2
0
0.2
0.4
Δm ndac - Δm cerga

Absolute astrometry of DS



ANNEX VI

ANNEX VII

Hipparcos Results Database

Status

- HIC—complete (including annex 1)
- Ground-based parallaxes (USNO, Allegheny)
- Mark III positions
- FAST astrometric solutions (single stars)
  - 18-months iterated
  - 30-months
  - 37-months
  - 37-months iterated
- NDAC astrometric solutions (single stars)
  - 18-months
  - 30-months
  - 37-months preliminary
- NDAC/FAST merged solutions
  - 18-months
  - 30-months

Hipparcos Results Database

Status (continued)

- NDAC accumulated photometry (preliminary)
- FAST accumulated photometry (preliminary)

Hipparcos Results Database

Expected . . .

- NDAC 37-month solution (2nd version)
- Merged 37-month solution
- Tycho astrometry?

Still needed . . .

- Notes and the like (a few have arrived)
- Photometry results
- Multiplicity definitions (preliminary results . . .)

Hipparcos Results Database

Output

- Extract
  - Inserted stars
  - Deleted stars
- Formatting
  - Machine readable
  - TEX → PS

Number		Identifier: Epoch J2000					Position: Epoch J1991.25			Par.	Proper Motion		Standard Errors					Astrometric Correlations (%)										Soln	
HIP		RA (ICRS) h m s	dec ±° ′ ″	V_J mag			α (ICRS) deg	δ deg		π mas	$\mu_{\alpha*}$ mas/yr	μ_δ mas/yr	α* mas	δ mas	π mas	$\mu_{\alpha*}$ mas/yr	μ_δ mas/yr	δ α*	π α*	$\mu_{\alpha*}$ α*	μ_δ α*	π δ	$\mu_{\alpha*}$ δ	μ_δ δ	$\mu_{\alpha*}$ π	μ_δ π	μ_δ $\mu_{\alpha*}$	Rej %	GOF
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
87901		17 57 19.89	+04 53 14.9	8.74		D	269.332 889 39	+04.887 499 84		5.63	–12.10	–13.91	1.30	1.12	1.57	1.48	1.32	+2	–27	–32	+10	–26	+1	–38	+20	–2	+10	0	0.09
87902		17 57 21.03	+35 40 29.7	7.60		A	269.337 590 58	+35.674 889 15	B	5.14	4.30	7.52	0.68	0.70	0.86	0.79	0.80	+8	–17	+15	+10	–18	+13	+0	–24	–6	+7	0	–0.31
87903		17 57 21.46	–28 11 18.2	9.57		B	269.339 419 15	–28.188 229 53		7.76	2.21	–60.28	1.82	1.32	2.01	2.54	1.39	–5	–17	+1	+14	–17	+30	–71	–21	+27	–18	4	0.97
87904		17 57 22.46	–38 54 31.6	8.40		B	269.343 633 29	–38.908 722 07		12.43	–11.49	–22.51	1.42	0.77	1.62	2.07	0.83	+1	–28	+26	–20	+14	–39	–5	–18	+0	+36	0	–0.17
87905		17 57 22.62	+26 35 19.9	8.80		C	269.344 224 46	+26.588 822 53		0.57	8.42	–60.51	1.37	1.47	2.16	2.00	1.89	–14	–1	–10	+14	–0	+17	–6	–8	+8	+10	0	0.72
87906		17 57 22.93	+38 58 06.0	8.30		E	269.345 436 60	+38.968 390 21		16.92	25.53	–26.09	0.78	0.91	1.03	0.88	1.07	–1	–10	+5	+5	–8	+6	+1	–25	–3	+5	0	–0.34
87907		17 57 24.04	+51 11 18.0	8.77		B	269.350 245 38	+51.188 342 64	A	6.08	–20.24	–17.19	1.07	1.00	1.10	1.25	1.23	+15	–7	–10	–3	–0	–0	+8	–4	–4	+32	13	2.24
87908		17 57 24.20	+33 47 34.1	8.50	1	D	269.350 871 94	+33.792 825 36		–0.18	–12.78	–10.57	0.76	0.79	1.00	0.82	0.96	+1	–19	–1	+8	–9	+8	+4	–13	–4	–2	0	0.38
87909		17 57 24.31	+33 24 03.0	6.88		B	269.351 262 20	+33.400 884 87		3.07	14.63	–15.61	0.60	0.64	0.80	0.70	0.75	+8	–23	–8	+9	–20	+12	+6	–13	–2	+6	0	0.51
87910		17 57 26.99	+11 02 40.4	6.34		D	269.362 472 49	+11.044 574 70		8.13	–7.47	–68.46	0.79	0.71	1.06	0.80	0.69	–12	–20	–9	+42	–16	+47	+24	–11	–20	+2	3	0.26
87911		17 57 28.54	+10 57 46.7	8.49		A	269.368 931 95	+10.962 994 77	*	3.21	–5.94	–7.71	1.18	1.09	1.54	1.18	1.08	+9	–20	+8	+53	+4	+55	+36	+0	–20	+23	3	–0.32
87912		17 57 30.39	+48 17 44.2	7.80		B	269.376 607 56	+48.295 604 82		6.19	0.71	2.77	0.75	0.67	0.77	0.87	0.79	–3	–21	–21	+8	–3	+10	–2	+8	+1	+2	0	0.09
87913	Y	17 57 31.29	+54 39 55.9	7.60	3	A	269.380 429 52	+54.665 561 06		4.26	–13.94	–16.93	0.70	0.73	0.80	0.78	0.99	–2	–3	+4	+1	–4	+0	+16	–29	–11	–3	0	–0.80
87914		17 57 31.69	–57 39 51.2	8.10		B	269.381 776 76	–57.663 903 40	A	16.75	57.39	–154.72	1.67	1.19	2.01	1.90	1.32	+11	–37	–20	–32	–17	–29	–37	+7	+27	+9	0	1.32
87915		17 57 31.85	+33 50 50.0	7.87		B	269.382 661 52	+33.847 209 00		–2.24	19.62	2.10	0.66	0.74	0.90	0.71	0.90	+0	–16	–10	+8	–10	+7	+10	–14	–3	–6	2	–0.62
87916		17 57 33.83	–50 07 05.2	9.60		C	269.390 933 96	–50.118 111 93		–0.03	3.31	–138.69	2.04	1.35	2.50	2.52	1.51	–30	–28	+17	–20	–1	–25	–20	+9	+23	–7	3	0.53
87917		17 57 33.95	+29 28 05.0	8.40		A	269.391 469 26	+29.468 069 17		3.35	–5.74	–3.66	0.75	0.88	1.12	0.87	1.00	+6	–13	–18	+9	–17	+10	+7	–2	–2	+8	0	0.28
87918		17 57 34.31	–19 53 22.4	8.90		A	269.392 944 70	–19.889 547 22		–3.01	3.07	–46.98	1.60	0.88	1.70	2.13	1.02	+24	–43	+26	+12	–22	+17	–29	–19	+6	+28	0	–0.79
87919		17 57 34.39	–25 04 56.5	8.59		A	269.393 276 91	–25.082 361 35		3.00	–1.62	–44.59	1.30	0.74	1.47	1.56	0.78	+15	–29	+11	–1	–22	+19	–52	–18	+27	–8	0	0.30
87920		17 57 34.78	+27 59 31.6	8.82		D	269.394 884 44	+27.992 222 17	A	5.73	18.65	–17.15	0.87	1.03	1.37	1.09	1.22	+11	+5	+5	+10	+1	+11	+9	+2	+10	+17	0	–0.82
87921		17 57 35.69	–11 32 01.1	8.38		A	269.398 993 69	–11.533 550 93		10.61	–114.06	–39.00	1.45	0.84	1.59	1.51	0.97	–8	–42	+14	–5	–10	+4	–29	–9	+3	–31	0	0.10
87922	X	17 57 38.65	–40 33 27.2	11.60	3	B	269.411 089 65	–40.557 539 67		–3.37	–11.64	–70.95	3.52	1.87	3.65	4.36	1.85	+22	–20	+19	–36	–4	–37	–33	–4	+10	+13	0	0.87
87923		17 57 40.77	–35 58 20.0	9.30		D	269.419 826 37	–35.972 214 61		3.87	8.10	–6.31	2.37	1.48	2.50	3.75	1.72	–6	–29	+21	+4	–1	+18	–54	–10	+16	–19	0	–0.40
87924		17 57 40.93	–39 06 06.5	6.70		A	269.420 541 74	–39.101 740 25		4.96	–2.90	–22.72	1.06	0.57	1.18	1.55	0.61	–4	–22	+24	–22	+12	–41	–12	–14	+2	+28	0	–0.73
87925		17 57 40.98	–21 43 10.9	9.99		A	269.420 694 22	–21.719 293 25		42.86	22.71	–331.38	2.75	1.75	2.85	3.13	1.80	–33	–28	–37	+38	–25	+51	–70	–24	+16	–54	0	0.43
87926	Z	17 57 41.70	–76 10 40.6	6.06		A	269.423 722 32	–76.177 939 86	*	5.91	4.03	–1.35	0.49	0.54	0.69	0.63	0.65	–5	–16	–2	–8	+2	–11	–5	–0	–12	–24	2	0.24
87927		17 57 42.08	–02 41 03.6	8.80		B	269.425 319 07	–02.684 318 89		0.82	9.80	–23.63	1.60	1.25	1.83	1.67	1.29	+16	–18	–6	+2	–27	+0	–26	+10	+4	+10	0	–0.77
87928		17 57 42.75	–56 53 46.5	6.26		C	269.428 102 75	–56.896 217 10		1.97	1.20	–11.89	0.92	0.63	0.98	1.12	0.70	–9	–31	–7	–26	–9	–28	–15	–2	+9	–21	0	–0.18
87929		17 57 43.90	–22 14 01.4	9.40		B	269.432 933 89	–22.233 694 95		8.55	–1.99	–194.94	1.91	1.31	1.86	2.15	1.32	–39	–30	–40	+46	–14	+55	–77	–17	+6	–49	0	–0.10
87930		17 57 44.10	+28 15 13.0	8.24		D	269.433 756 52	+28.253 651 28	C	3.77	1.72	–12.75	0.81	0.93	1.27	1.05	1.12	+3	+3	–3	+9	–6	+10	–3	–3	+6	+13	0	–1.47
87931		17 57 44.79	–83 14 08.2	7.20		A	269.436 499 28	–83.235 398 29		7.34	3.66	–91.76	0.63	0.65	0.79	0.71	0.75	+1	–16	–1	–12	+0	–12	–6	–18	–2	–3	0	0.92
87932		17 57 45.65	+02 52 48.1	8.00		A	269.440 216 10	+02.880 061 73		–0.85	–0.38	9.91	1.30	0.92	1.51	1.48	1.10	+10	–35	+6	+12	–4	+11	–10	+12	+2	+15	0	–0.95
87933		17 57 45.89	+29 14 52.4	3.70	3	A	269.440 972 25	+29.247 931 25		21.48	88.39	–18.20	0.44	0.49	0.63	0.52	0.56	–2	–11	–18	+8	–8	+10	–2	–4	–0	+0	0	0.24
87934		17 57 46.12	+20 20 45.2	7.50		A	269.442 218 87	+20.345 867 04		2.89	–14.97	9.54	0.78	0.79	1.21	0.84	0.88	+1	–17	–8	+32	–1	+31	–5	–11	–11	–2	0	0.04
87935		17 57 46.43	–01 45 54.1	8.29		B	269.443 445 09	–01.765 059 26		6.12	0.32	–82.74	1.68	1.10	1.59	1.87	1.26	–20	–12	–50	+31	–25	+36	–52	–31	+7	–28	0	–0.34
87936	X	17 57 47.81	–41 42 58.6	4.87		B	269.449 216 75	–41.716 251 45		7.07	0.80	–14.75	0.92	0.51	0.98	1.12	0.51	+2	–25	+20	–28	+3	–30	–22	–8	+7	–4	0	–0.58
87937		17 57 48.50	+04 41 36.2	9.54	1	B	269.454 037 43	+04.668 294 17	B	557.24	–788.05	10328.06	1.54	1.31	1.80	1.79	1.57	+0	–19	–34	+4	–19	–1	–38	+13	–8	+11	0	–0.22
87938	X	17 57 50.97	+46 35 19.2	11.79		B	269.462 418 55	+46.587 247 31		62.37	–19.35	579.22	1.84	1.68	1.94	2.46	1.95	+6	–7	+5	+9	–7	+10	–4	–8	+6	+15	2	1.03
87939		17 57 51.01	+02 15 12.8	6.95		B	269.462 522 80	+02.253 557 15		7.33	3.60	3.25	0.93	0.72	1.11	1.26	0.92	+2	–24	–6	–1	–20	–1	–22	+18	+13	–0	0	–0.75
87940	X	17 57 53.91	–24 16 08.3	9.70		A	269.474 636 52	–24.268 941 02		–7.28	2.02	–40.99	1.71	1.05	1.85	2.05	1.10	+32	–31	–17	–24	–22	–9	–59	–19	+19	+9	0	1.20
87941	Z	17 57 54.11	+38 05 02.6	8.11		B	269.475 471 31	+38.084 087 85		2.01	–0.43	–9.50	0.80	0.80	0.96	1.03	0.96	+3	–10	+23	+10	–9	+8	+0	–17	–16	+14	0	0.08
87942		17 57 55.91	–22 58 32.9	9.21		A	269.482 944 83	–22.975 794 43		–6.50	3.21	–199.25	1.78	1.19	1.75	2.30	1.25	–34	–18	–28	+40	–10	+44	–64	–6	+9	–30	0	–0.76
87943		17 57 56.56	+17 24 18.0	8.70		E	269.485 654 38	+17.404 996 41		2.31	5.05	35.31	1.08	1.02	1.62	1.44	1.30	+17	–22	+6	+40	–21	+42	+0	–8	–5	–12	0	0.21
87944		17 57 56.57	+43 25 01.7	6.80		A	269.485 728 14	+43.417 122 80		6.31	–9.85	1.94	0.60	0.58	0.67	0.71	0.67	–2	–6	–21	+8	–14	+10	–7	–17	+0	+2	0	–0.65
87945		17 57 56.76	–36 00 28.5	6.70		D	269.486 469 02	–36.007 904 52	C	4.62	14.45	–9.12	1.17	0.74	1.27	1.81	0.89	+0	–13	+18	+6	–12	+16	–48	–3	+22	–10	0	0.50
87946		17 57 56.93	+04 14 52.1	9.55	3	A	269.487 215 12	+04.247 788 37		6.55	9.33	6.26	2.50	1.93	2.87	3.02	2.46	+4	–24	–24	+4	–6	–2	–27	+3	–18	+31	0	–0.47
87947	Z	17 57 57.57	–44 47 32.4	8.20		A	269.489 914 59	–44.792 211 01		14.13	–10.94	–55.79	1.43	0.68	1.45	1.69	0.68	–6	–20	+41	–42	–2	–37	–29	–6	+21	–20	0	–0.47
87948		17 57 57.80	–39 08 11.5	6.28		E	269.490 845 57	–39.136 460 20	C	8.27	–5.82	–22.73	1.09	0.58	1.22	1.57	0.62	–3	–25	+24	–22	+13	–40	–14	–15	+4	+28	0	–1.03
87949		17 57 57.89	–09 47 46.2	9.50		B	269.491 348 83	–09.796 000 43		14.49	–54.38	–80.37	2.05	1.53	2.22	3.28	2.03	+22	–12	–17	–12	–1	–14	–50	–28	–8	+27	0	0.06
87950		17 57 59.72	–48 17 26.5	8.40		A	269.498 842 49	–48.290 668 88		3.84	–2.94	–137.85	1.05	0.71	1.37	1.45	0.83	–31	–9	+13	–23	–3	–30	–16	+15	+18	–15	0	–0.08
87951		17 58 00.99	+50 19 27.4	8.50		B	269.504 163 20	+50.324 260 15		0.20	–5.49	–22.32	0.88	0.74	0.86	1.23	0.93	+17	–14	+5	+8	–3	+5	–6	–9	–12	+34	0	–1.53
87952		17 58 01.26	+42 00 07.3	7.91		A	269.505 315 90	+42.002 035 78		2.06	–14.05	–1.39	0.68	0.68	0.79	0.73	0.88	+0	–2	–10	+2	–9	+2	–21	–9	+4	+6	0	0.86
87953		17 58 02.61	–59 42 03.7	8.70		A	269.510 864 22	–59.700 991 73		6.78	–0.09	–14.16	1.13	0.83	1.39	1.27	0.82	–2	–14	–38	+11	+1	+15	–40	+4	+8	+19	0	–0.70
87954		17 58 03.19	+02 43 11.9	7.20	1	A	269.513 282 27	+02.719 966 01		3.98	2.78	–2.62	0.98	0.75	1.15	1.15	0.92	+1	–37	–6	+7	–11	+3	–11	+14	–2	+10	0	–0.03
87955		17 58 04.12	+24 32 37.3	9.20		C	269.517 160 30	+24.543 705 89		3.20	–2.88	–2.95	0.66	1.20	1.51	0.87	1.43	–4	–8	+5	+8	–18	+11	–9	–7	+11	–1	0	1.09
87956		17 58 04.98	–30 24 13.6	9.50		C	269.520 740 42	–30.403 786 70		–7.58	4.22	–18.36	2.39	1.42	2.64	3.03	1.46	+16	–29	+21	–3	–19	+28	–59	–31	+25	–23	0	–0.55
87957		17 58 05.03	–45 27 23.1	8.00		B	269.520 948 82	–45.456 379 01	*	3.42	4.37	–88.62	1.14	0.63	1.29	1.40	0.65	–14	–20	+27	–27	–9	–24	–28	–11	+27	–23	0	–0.60
87958	X	17 58 05.01	+32 38 53.1	6.60		B	269.520 957 75	+32.648 137 17		19.48	–27.54	–27.77	0.60	0.60	0.79	0.69	0.69	+7	–23	–19	+4	–18	+7	–2	–17	–0	+4	0	–0.23
87959		17 58 05.19	+21 19 22.8	8.10		E	269.521 601 83	+21.323 030 81		–3.78	12.40	–55.46	0.75	0.83	1.27	1.07	1.07	–10	–10	–32	+24	–2	+29	+5	+5	–14	+1	0	–0.54
*87960		17 58 05.39	+52 13 05.9	7.52		E	269.522 392 10	+52.218 342 76	B	10.42	14.39	–20.71	0.71	0.71	0.77	0.75	0.95	+1	+14	–9	+6	–6	+6	+9	–3	–18	–11	3	0.24
87961		17 58 05.53	+71 59 08.0	10.82		D	269.522 163 73	+71.986 332 52		19.22	120.84	–319.24	1.42	1.48	1.48	1.55	2.05	+5	–27	–30	+10	–13	+8	–20	–0	+0	+8	3	–0.58
87962		17 58 06.38	–43 24 21.8	10.82		B	269.526 622 25	–43.406 110 81		–5.82	–7.64	19.18	2.77	1.49	3.11	3.43	1.59	+7	–34	+13	–28	–14	–14	–45	–9	+32	–15	0	–0.56
87963		17 58 06.62	–59 34 49.5	9.30		B	269.527 621 81	–59.580 340 85		13.40	–3.70	–31.94	1.66	1.19	1.91	1.85	1.18	–6	–20	–45	+11	+3	+15	–44	+2	–2	+14	0	–1.14
87964	X	17 58 06.97	–46 11 56.0	9.51		A	269.528 995 68	–46.198 848 30		6.42	12.29	–14.01	2.00	1.13	2.33	2.58	1.21	–5	–27	+20	–30	–7	–31	–29	+3	+30	–3	0	0.00
87965		17 58 06.99	+15 08 21.9	7.43	3	C	269.529 156 23	+15.139 242 41		11.34	–16.80	11.66	0.82	0.75	1.11	0.94	0.84	–15	–17	–3	+36	–17	+37	–2	–13	–4	–21	0	–0.23
87966		17 58 07.89	–31 32 23.8	10.50		E	269.532 867 92	–31.539 906 76		9.41	4.00	–13.57	1.63	0.93	1.79	2.13	0.99	–1	–39	+16	+7	–23	+30	–60	–18	+22	–25	0	–0.43
87967		17 58 07.93	–18 15 28.4	9.20		B	269.533 069 72	–18.257 871 54		6.73	–7.38	–11.59	1.97	1.24	2.27	2.70	1.48	+0	–16	–2	+6	–9	+10	–32	–25	+13	+4	0	–0.55
87968	X	17 58 09.35	–81 27 12.2	7.30		C	269.539 093 90	–81.453 116 43		18.30	–6.71	–117.86	0.66	0.62	0.84	0.72	0.75	–2	–32	–7	–5	–1	–6	–0	–13	–2	–11	0	0.19
87969		17 58 10.04	–62 09 30.8	8.80		A	269.541 856 50	–62.158 470 15		1.06	–2.29	–25.70	1.10	0.89	1.37	1.30	0.95	+12	–19	–19	–9	–11	–10	–40	+11	+15	+22	0	–0.43
87970		17 58 10.35	+27 23 50.8	7.90		A	269.543 089 21	+27.397 409 94	A	1.20	14.39	12.56	0.65	0.71	1.00	0.82	0.83	+1	–6	–9	+10	+3	+11	–8	–2	+6	+13	0	0.66
87971		17 58 10.50	+40 06 43.3	8.92		B	269.543 767 92	+40.112 087 67		5.59	0.58	–25.91	0.83	0.92	1.02	0.87	1.09	+8	–11	–7	+4	–3	+4	+8	–2	–3	+9	0	–0.64
87972	X	17 58 10.81	–02 09 11.7	8.60		A	269.545 037 21	–02.153 201 25		11.85	1.17	–24.47	1.46	1.04	1.58	1.55	1.15	–3	–28	–1	+4	–16	+7	–20	–15	+6	+5	0	0.51
87973		17 58 10.88	–37 20 15.5	7.65		C	269.545 343 69	–37.337 525 66		11.11	–5.20	–43.15	1.27	1.03	1.60	2.07	1.26	–5	–14	+8	–0	–48	+29	–72	–31	+53	–38	0	–0.87
87974		17 58 15.76	+03 55 42.6	9.01		A	269.565 638 41	+03.928 514 50		6.50	5.76	–5.42	1.47	1.00	1.63	1.68	1.28	–0	–37	–27	+9	+6	+1	–26	+8	–21	+26	0	–0.87
87975		17 58 15.96	–18 10 24.1	9.40		C	269.566 484 70	–18.173 334 20		4.32	11.85	–16.49	1.57	0.98	1.77	2.12	1.12	–8	–19	+3	–1	–17	+5	–36	–20	+12	–15	0	–0.07
87976	X	17 58 16.48	+10 10 15.4	8.20		D	269.568 665 53	+10.170 945 03		8.91	1.09	–46.16	1.01	0.91	1.30	1.28	1.12	–10	+3	–9	+21	–2	+24	+0	–10	+0	+26	0	0.06
87977	Z	17 58 16.58	–41 23 18.7	10.16		A	269.569 079 79	–41.388 509 49		–5.98	4.71	–2.33	1.91	1.05	2.11	2.44	1.04	+3	–32	+14	–30	+14	–40	–40	–16	+6	+13	0	–0.35
87978		17 58 17.85	–38 10 24.0	8.70		B	269.574 354 94	–38.173 293 13	B	–0.53	11.86	–13.05	2.26	1.10	2.38	2.99	1.16	+3	–34	+23	–28	–14	–35	–42	+1	+30	+15	0	–0.42
87979	Y	17 58 18.10	–58 54 34.0	9.00		A	269.575 420 33	–58.909 411 84		–3.32	0.11	–12.45	1.27	0.94	1.57	1.48	0.99	–4	–8	–29	+13	+2	+16	–34	+2	+14	+16	0	–1.12
87980		17 58 19.11	–50 09 39.6	9.96	3	C	269.579 653 80	–50.161 004 06		2.99	–15.62	–108.70	1.44	0.99	1.78	1.84	1.12	–25	–20	+14	–24	–3	–30	–20	+9	+14	–9	0	–0.04
87981		17 58 19.60	–23 42 07.6	8.55		C	269.581 595 32	–23.702 075 55		7.95	26.14	–13.21	1.47	0.90	1.63	1.60	0.90	–1	–39	–10	+13	–22	+19	–51	–15	+5	–5	0	–0.32
87982		17 58 19.98	+27 59 20.5	8.79		A	269.583 224 86	+27.989 103 79		6.56	4.74	–26.97	0.74	0.85	1.13	0.95	1.00	+7	–5	–17	+3	–10	+4	–5	–2	+3	+4	0	–0.82
87983		17 58 20.54	+14 30 38.1	7.38		E	269.585 544 41	+14.510 638 80		4.40	11.50	–18.16	0.77	0.67	1.06	0.94	0.84	–4	–17	–7	+39	–13	+32	+15	+12	–27	–21	0	–0.70
87984		17 58 21.70	+55 06 49.1	8.56		E	269.590 157 92	+55.113 575 09		11.96	63.84	22.60	0.83	0.88	0.92	0.95	1.19	+6	–10	+1	+11	+2	+7	+17	–18	–4	–2	0	–0.50
87985		17 58 22.45	–32 54 34.8	8.77		A	269.593 541 16	–32.909 669 40		–0.71	–5.25	28.48	1.64	1.04	1.64	2.23	1.13	+31	–32	–2	–34	–26	–19	–70	–4	+30	+8	0	–0.92
87986		17 58 22.86	+14 36 50.9	8.30		A	269.595 188 74	+14.614 137 89	B	10.48	16.51	–69.44	1.08	0.99	1.56	1.27	1.26	–15	–19	–8	+39	–13	+34	+18	+6	–37	–17	13	2.52
87987		17 58 23.09	+35 24 28.1	8.80		C	269.596 198 01	+35.407 755 77	B	2.81	–2.62	42.26	0.97	0.96	1.20	1.08	1.10	+14	–21	+17	+10	–11	+10	+8	–17	–10	+8	7	1.87
87988		17 58 24.17	–55 09 46.4	8.20		A	269.600 707 15	–55.162 854 41	A	10.10	–1.17	–129.81	1.87	1.38	2.19	2.33	1.50	–23	–30	+23	–30	+8	–35	–3	–19	+12	–15	8	0.95
*87989		17 58 24.45	+07 30 12.6	9.80		C	269.601 849 88	+07.503 466 48		–2.14	7.10	–49.96	1.59	1.50	1.99	1.88	1.73	–16	–16	–28	+21	–26	+23	–34	–5	+8	–4	0	–0.58
87990	X	17 58 24.44	–52 00 03.6	12.09		A	269.601 828 66	–52.000 996 68		–7.89	1.72	–118.77	2.68	1.85	3.12	3.26	2.04	–26	–27	+17	–22	–6	–20	–16	–9	+12	–38	0	–0.26
87991		17 58 24.43	+04 27 41.3	9.80		C	269.601 923 34	+04.461 617 46	C	29.41	–51.75	–58.25	1.88	1.52	2.17	2.52	2.06	–0	–19	–17	–3	–3	–8	–23	–3	–18	+12	5	0.41
87992		17 58 25.69	+36 52 29.3	7.32		D	269.607 316 92	+36.874 635 31		5.84	–83.83	73.31	0.65	0.70	0.82	0.75	0.92	+8	–3	+13	+7	–6	+6	+18	+1	–12	+3	0	–0.32
87993		17 58 25.80	–35 04 00.2	8.28		A	269.607 621 92	–35.066 651 91		4.26	–39.73	–23.89	1.35	0.81	1.43	1.83	0.91	+11	–26	+12	–15	–17	–0	–58	–2	+27	–9	0	–0.64
87994		17 58 27.22	+01 06 05.3	11.25	3	A	269.613 442 71	+01.101 440 24		–6.40	–8.95	–50.64	3.20	2.32	3.33	3.53	2.62	+46	–41	–16	–10	–31	–16	–33	+12	–2	+40	0	–0.52
87995		17 58 27.32	–57 47 34.0	9.00		B	269.613 695 01	–57.792 763 41		9.07	25.93	–50.21	1.42	0.97	1.61	1.66	1.10	–12	–38	–8	–27	–2	–26	–11	+10	+16	–9	0	0.28
87996		17 58 27.97	–44 58 39.5	8.80		B	269.616 562 20	–44.977 357 27	C	14.33	–12.87	–118.61	1.45	0.73	1.55	1.67	0.75	–1	–29	+36	–39	–6	–29	–28	–10	+28	–19	0	–0.88
87997		17 58 28.95	+75 38 25.6	9.02		C	269.620 623 55	+75.640 401 77		1.04	–3.32	44.25	0.89	0.97	0.92	0.99	1.17	+13	–14	–28	–0	+15	–6	–38	–10	–15	+32	0	–0.34
87998		17 58 30.15	+30 11 21.4	4.41	3	B	269.625 634 80	+30.189 275 79		2.35	3.05	2.87	0.50	0.50	0.67	0.64	0.59	+0	–3	–30	+4	–2	+5	–3	–16	–11	+6	0	0.00
87999		17 58 30.86	+13 11 54.1	10.00		C	269.628 590 27	+13.198 354 45		5.45	6.09	–1.25	1.44	1.39	3.00	2.01	1.97	+19	–32	+4	+41	–3	+27	+22	+12	–44	–37	0	–0.84
88000		17 58 31.47	–36 26 58.4	9.00		A	269.631 131 43	–36.449 573 02		6.20	–0.48	–97.97	1.77	1.30	1.93	3.12	1.55	–22	–12	+6	+21	–25	+43	–71	–14	+38	–40	0	0.84

34230 | 14681

No. HIP	Tycho Magnitudes B_T	σ	V_T	σ	Colour Indices B_T-V_T	σ		V-I	σ		Magnitude (Hp) Hp	σ	s	N		Variability (Hp) Max	Min	P		Multiplicity Data CCDM		Flags	AB	θ	ρ	σ_ρ	ΔHp	σ	Misc Flags
	mag	mag	mag	mag	mag	mag		mag	mag		mag	mag	mag			mag	mag	days						°	″	″	mag	mag	
31	32	33	34	35	36 37	38	39	40	41	42-3	44	45	46	47	48	49	50	51	52-4	55	56-7	58-61	62	63	64	65	66	67	68-70
87901	9.270	0.100	8.740	0.100	0.530	0.110	A	0.65	0.11	B	8.8085	0.0021	0.068	71					H 1										
87902	8.670	0.350	7.600	0.350	1.070	0.200	A	0.95	0.20	E	7.7554	0.0011	0.051	146						17574+3540	I 1	2 B F A		145	17.15	0.14	2.32	0.13	S
87903	10.142	0.030	9.570	0.030	0.572	0.020	B	0.64	0.02	D	9.6734	0.0028	0.081	99					H 2										C
87904	8.960	0.350	8.400	0.350	0.560	0.100	A	0.63	0.10	E	8.5180	0.0017	0.087	115					H										
87905	9.530	0.350	8.800	0.350	0.730	0.130	D	0.94	0.13	B	8.8633	0.0021	0.088	171															
87906	8.860	0.350	8.300	0.350	0.560	0.070	A	0.56	0.07	E	8.7057	0.0020	0.087	120															S
87907	9.400	0.350	8.770	0.350	0.630	0.130	A	0.59	0.13	A	9.4766	0.0028	0.124	120	*	9.41	9.54		M	17574+5111	H 1	2 B S A	AB	82	7.09	0.05	2.34	0.11	
87908	10.190	0.350	8.500	0.350	1.690	0.090	B	3.39	0.09	D	8.1804	0.0117	0.404	137		8.07	8.47		U B										
87909	7.790	0.030	6.880	0.030	0.910	0.020	A	0.90	0.02	E	7.0461	0.0009	0.043	146															S
87910	6.459	0.015	6.341	0.015	0.118	0.018	B	0.11	0.02	A	6.3770	0.0009	0.031	111															S
87911	8.980	0.030	8.490	0.030	0.490	0.042	D	0.51	0.04	A	8.5079	0.0014	0.058	103	*					17575+1058	I 1	2 A F A	AB	0	0.90	0.04	1.45	0.11	
87912	9.030	0.350	7.800	0.350	1.230	0.200	A	1.20	0.20	B	7.9291	0.0015	0.052	129															S
87913	9.100	0.360	7.600	0.360	1.500	0.500	A	1.48	0.50	A	7.4890	0.0017	0.068	97															S
87914	8.900	0.350	8.100	0.350 *	0.800	0.490	E	0.83	0.49	B	8.3316	0.0028	0.106	98	B	8.29	8.40		X	17575–5740	H 1	3 B A B	AB	207	5.46	0.14	2.32	0.01	
87915	8.870	0.030	7.870	0.030	1.000	0.040	A	1.19	0.04	B	8.0007	0.0017	0.065	141															
87916	10.000	0.370	9.600	0.370	0.400	0.110	A	0.46	0.11	E	10.3053	0.0045	0.223	102		10.15	10.38		I										
87917	9.660	0.350	8.400	0.350	1.260	0.220	A	1.14	0.22	A	8.6671	0.0019	0.104	159		8.62	8.72		X										
87918	10.100	0.350	8.900	0.350	1.200	0.210	D	1.16	0.21	A	8.8296	0.0022	0.066	80															
87919	8.895	0.030	8.590	0.030	0.305	0.020	E	0.35	0.02	A	8.6846	0.0015	0.065	108															
87920	9.290	0.031	8.820	0.031	0.470	0.015	B	0.54	0.01	D	8.9039	0.0023	0.118	144	B	8.85	8.97		I 1 B	17576+2800	I 2	1 A C A	AB	189	5.64	0.08	2.13	0.12	
87921	9.031	0.031	8.380	0.031	0.651	0.015	B	0.71	0.01	A	8.5174	0.0022	0.062	66					H										
87922					0.400	0.500	A	0.42	0.50	C	11.5097	0.0488	1.177	115		10.85	12.03	0.40	E B										C
87923	9.880	0.350	9.300	0.350	0.580	0.070	D	0.65	0.07	A	9.5007	0.0028	0.099	69					H										
87924	6.730	0.350	6.700	0.350	0.030	0.100	B	0.01	0.10	D	6.6600	0.0008	0.029	131															S
87925			9.990	0.008	1.282	0.005	D	1.46	0.01	B	10.0858	0.0034	0.138	90		10.03	10.17		C B										C
87926	7.262	0.008	6.057	0.008	1.205	0.005	A	1.16	0.01	D	6.2499	0.0008	0.043	158	*					17577–7611	W 1	2 A F A		16	13.68	0.01	1.93	0.05	S
87927	10.360	0.350	8.800	0.350	1.560	0.320	A	1.57	0.32	E	9.4558	0.0036	0.122	71		9.40	9.52		S 1										
87928	6.231	0.005	6.264	0.005	–0.033	0.020	D	–0.04	0.02	B	6.2471	0.0008	0.026	91															S
87929			9.400	0.350	1.390	0.320	A	1.36	0.32	B	9.0307	0.0033	0.097	93															C
87930	9.221	0.041	8.241	0.041	0.980	0.140	A	0.96	0.14	B *	8.3857	0.0018	0.086	150	B					17577+2815	I 1	2 B U A	AB	149	17.14	0.04	0.38	0.09	
87931	7.567	0.031	7.204	0.031	0.363	0.015	D	0.37	0.01	C	7.2868	0.0011	0.051	138															S
87932	8.240	0.350	8.000	0.350	0.240	0.140	B	0.21	0.14	C	8.2745	0.0016	0.062	71					H										S
87933	4.634	0.002	3.699	0.002	0.935	0.002	A	0.89	0.00	E	3.8643	0.0013	0.049	161															S
87934	8.580	0.350	7.500	0.350	1.080	0.220	B	1.00	0.22	A	7.6075	0.0016	0.063	127															S
87935	10.200	0.100	8.290	0.100	1.910	0.350	A	1.93	0.35	D	8.2826	0.0028	0.064	60															
87936	6.491	0.004	4.871	0.004	1.620	0.080	D	1.88	0.08	B	4.9534	0.0021	0.061	119					H 2										S
87937			9.540	0.031	1.570	0.015	B	2.52	0.01	C *	9.3739	0.0049	0.161	67		9.34	9.50		P	17578+0441	I 1	2 A C A		324	15.64	0.05	1.48	0.15	N
87938					1.560	0.015	A	2.48	0.01	A	11.6344	0.0061	0.250	129		11.56	11.81		S										C
87939	7.099	0.031	6.950	0.031	0.149	0.015	B	0.16	0.01	A	6.9840	0.0011	0.036	83					H										S
87940			9.700	0.030	0.849	0.020	A	0.86	0.02	A	9.8525	0.0019	0.070	97					H 1										C
87941	9.179	0.100	8.109	0.100	1.070	0.200	A	1.29	0.20	D	8.2411	0.0020	0.078	99															
87942			9.210	0.019	1.573	0.002	A	1.55	0.00	C	9.2897	0.0027	0.071	95															
87943	9.800	0.350	8.700	0.350	1.100	0.220	B	1.09	0.22	B	9.0781	0.0023	0.110	129					H										
87944	6.780	0.021	6.800	0.021	–0.020	0.090	A	0.00	0.09	A	6.8290	0.0009	0.034	117					H 1										S
87945	6.800	0.350	6.700	0.350	0.100	0.490	A	0.11	0.49	B	6.8046	0.0013	0.035	77						17579–3600	W 1	2 A A A	AB	187	5.73	0.14	1.49	0.07	S
87946			9.547	0.012	1.733	0.017	D	0.15	0.02	E	10.6966	0.0061	0.246	73		10.55	10.79		C										
87947	8.710	0.350	8.200	0.350	0.510	0.100	D	0.60	0.10	D	8.3923	0.0013	0.050	136					H 2										
87948	6.291	0.007	6.284	0.007	0.007	0.005	C	0.03	0.01	E	6.2956	0.0008	0.026	136	*					17580–3908	W 1	2 A U A	AB	334	15.30	0.07	1.95	0.00	S
87949	10.180	0.350	9.500	0.350	0.680	0.150	C	0.74	0.15	B	10.3095	0.0034	0.103	75		10.24	10.35		S										C
87950	9.670	0.350	8.400	0.350	1.270	0.130	B	1.27	0.13	E	8.2988	0.0014	0.066	136															
87951	9.570	0.350	8.500	0.350	1.070	0.200	A	0.92	0.20	E	8.6292	0.0018	0.081	109															
87952	8.634	0.041	7.914	0.041	0.720	0.130	A	0.92	0.13	A	8.0287	0.0014	0.066	116															S
87953	9.040	0.350	8.700	0.350	0.340	0.140	B	0.49	0.14	D	8.8035	0.0022	0.081	130															
87954	8.860	0.030	7.200	0.030	1.660	0.240	D	1.83	0.24	C	7.1014	0.0025	0.075	76															S
87955	9.290	0.350	9.200	0.350	0.090	0.140	E	0.08	0.14	E	8.9823	0.0020	0.118	191		8.93	9.05		U B										
87956			9.500	0.100	2.100	0.490	A	2.09	0.49	C	10.0901	0.0038	0.145	103		10.01	10.15		E										C
87957	8.000	0.350	8.000	0.350	0.000	0.490	B	0.32	0.49	C	7.8659	0.0011	0.046	127	*					17581–4527	W 2	2 A N A	AB	316	3.63	0.14	2.55	0.07	S
87958	7.062	0.031	6.596	0.031	0.466	0.001	A	0.54	0.00	A	6.7572	0.0031	0.084	133															S
87959	9.348	0.023	8.098	0.023	1.250	0.220	A	1.55	0.22	D	8.1057	0.0019	0.082	138															
*87960	7.790	0.031	7.520	0.031	0.270	0.015	B	0.30	0.01	A	7.5063	0.0016	0.052	94	A				H A	17581+5213	I 1	2 B F A	AB	117	11.12	0.13	3.32	0.00	S
87961					1.110	0.020	C	1.19	0.02	D	10.9970	0.0036	0.134	106		10.92	11.06		U										C
87962					0.690	0.400	A	0.74	0.40	C	11.4143	0.0060	0.236	113		11.30	11.53		I 1										C
87963	9.680	0.350	9.300	0.350	0.380	0.070	E	0.45	0.07	E	9.3831	0.0027	0.100	123															
87964	10.000	0.370	9.510	0.370	0.490	0.110	B	0.56	0.11	A	10.0345	0.0032	0.115	106		9.99	10.11		I										
87965	7.830	0.230	7.430	0.230	0.400	0.340	A	0.68	0.34	C	7.3739	0.0050	0.722	125		7.33	8.05	3.90	S 1 A										S
87966					0.780	0.130	B	0.81	0.13	A	9.3558	0.0016	0.061	91															C
87967	9.850	0.350	9.200	0.350	0.650	0.150	A	0.72	0.15	D	10.1040	0.0040	0.130	90		10.04	10.17		E										
87968	7.740	0.031	7.305	0.031	0.435	0.015	A	0.47	0.01	B	7.3974	0.0009	0.055	132															S
87969	9.890	0.350	8.800	0.350	1.090	0.130	A	1.07	0.13	B	8.9497	0.0026	0.132	94		8.90	9.04		E										
87970	9.100	0.350	7.900	0.350	1.200	0.490	E	1.17	0.49	A	7.7236	0.0015	0.066	148	A					17582+2724	I 1	3 A L A	AB	155	14.36	0.08	3.25	0.14	
87971	9.481	0.021	8.921	0.021	0.560	0.070	C	0.59	0.07	B	9.0503	0.0023	0.095	105															
87972	9.130	0.350	8.600	0.350	0.530	0.110	A	0.55	0.11	B	9.0266	0.0023	0.084	67															
87973	8.072	0.031	7.652	0.031	0.420	0.015	C	0.49	0.01	A	7.7457	0.0016	0.049	78															S
87974	9.017	0.031	9.006	0.031	0.011	0.015	D	0.03	0.01	D	9.0098	0.0041	0.118	73					H										
87975			9.400	0.350	1.270	0.230	B	1.23	0.23	D	9.3748	0.0028	0.092	91															C
87976	8.360	0.350	8.200	0.350	0.160	0.140	B	0.14	0.14	A	8.3921	0.0017	0.070	90															S
87977	10.490	0.030	10.160	0.030	0.330	0.020	B	0.38	0.02	B	10.1681	0.0033	0.142	123		10.11	10.25		X										C
87978	9.200	0.350	8.700	0.350	0.500	0.490	A	0.51	0.49	B	8.8652	0.0021	0.073	102						17583–3810	W 1	2 A N B	AB	17	12.29	0.11	2.80	0.14	
87979	10.360	0.350	9.000	0.350	1.360	0.130	A	1.33	0.13	B	9.0802	0.0022	0.089	112															
87980			9.960	0.390	0.900	0.500	E	0.90	0.50	A	9.4064	0.0030	0.102	109		9.37	9.47		C B										C
87981	8.981	0.030	8.550	0.030	0.431	0.020	A	0.50	0.02	B	8.6737	0.0027	0.091	102															
87982	9.170	0.031	8.790	0.031	0.380	0.015	A	0.44	0.01	B	8.8546	0.0018	0.070	141															
87983	7.459	0.031	7.377	0.031	0.082	0.015	D	0.06	0.01	E	7.4151	0.0011	0.047	119															S
87984	9.270	0.050	8.560	0.050	0.710	0.130	E	0.58	0.13	E	8.6443	0.0019	0.073	93															
87985	10.220	0.050	8.770	0.050	1.450	0.210	B	1.45	0.21	C	8.7163	0.0018	0.068	91															
87986	9.500	0.350	8.300	0.350	1.200	0.490	B	1.19	0.49	B	8.4857	0.0021	0.079	119	*					17584+1437	W 2	2 A S A		10	12.81	0.06	1.62	0.08	
87987	9.100	0.350	8.800	0.350	0.300	0.490	C	0.48	0.49	A	9.4415	0.0026	0.111	139					H	17584+3524	W 2	2 B F A	AB	219	5.54	0.10	1.59	0.03	
87988	9.200	0.350	8.200	0.350	1.000	0.490	E	0.98	0.49	B	8.3472	0.0019	0.073	86	C					17584–5510	H 2	3 A N C	AB	262	1.39	0.05	1.91	0.08	
*87989	10.490	0.350	9.800	0.350	0.690	0.150	A	0.75	0.15	B	10.3806	0.0032	0.174	80		10.31	10.49		P										C
87990							B	0.77		A	11.6182	0.0057	0.213	94		11.62	11.84		M										C
87991			9.804	0.031	1.188	0.015	A	1.40	0.01	E	9.9012	0.0033	0.116	77	C	9.86	9.97		U	17584+0428	H 1	3 A U B	AB	356	19.85	0.06	0.11	0.14	C
87992	8.387	0.023	7.317	0.023	1.070	0.200	A	0.93	0.20	C	7.4923	0.0011	0.057	121															S
87993	9.260	0.180	8.280	0.180	0.980	0.140	A	1.02	0.14	B	8.3859	0.0014	0.053	96															
87994					0.570	0.150	B	0.64	0.15	D	11.4039	0.0221	0.509	60		11.16	11.67	0.10	M										C
87995	9.770	0.350	9.000	0.350	0.770	0.130	A	0.99	0.13	A	9.1140	0.0020	0.067	98															
87996	9.390	0.350	8.800	0.350	0.590	0.100	A	0.66	0.10	C	8.8392	0.0019	0.097	130	A					17585–4458	W 1	2 A C A		205	4.80	0.02	1.18	0.02	
87997	10.020	0.030	9.020	0.030	1.000	0.040	B	0.98	0.04	D	9.1866	0.0021	0.068	106					H										
87998	4.793	0.014	4.413	0.014	0.380	0.004	C	0.51	0.00	A	4.4991	0.0007	0.025	142															S
87999			10.000	0.350	1.390	0.400	B	1.36	0.40	D	10.8017	0.0047	0.193	159					H										C
88000	9.150	0.350	9.000	0.350	0.150	0.140	C	0.60	0.14	C	9.1700	0.0023	0.078	88					H A										