JMMC

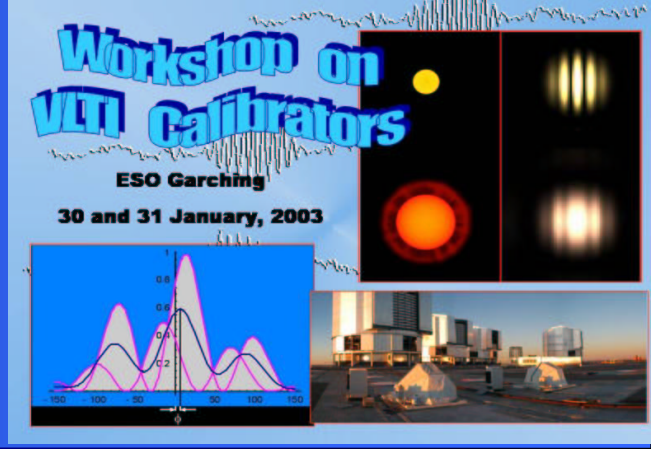
Observatoire de la Côte d'Azur

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE

Département A. FRESNEL
UMR 6528 et EP 2122 du CNRS

The JMMC Calibrator Selection Tool

Pierre Cruzalèbes



Goal : develop a specific selection tool

- Build an evolutive catalogue of calibrators
- Select the calibrators according to :
  - the astrophysical program
  - the instrumental configuration
  - some useful information on the calibrators

Scientific Group

- D. Bonneau, PI (OCA)
- P. Cruzalèbes, OCA
- D. Mourard, OCA
- X. Delfosse, LAOG
- P. Bordé, OPM
- R. Petrov, UNSA

In charge of the scientific studies :

- Define the catalogues (at CDS) and the useful parameters
- Define the calculation methods
- Test the program and verify the results
- Define the scientific requirement
- Write the User Manual

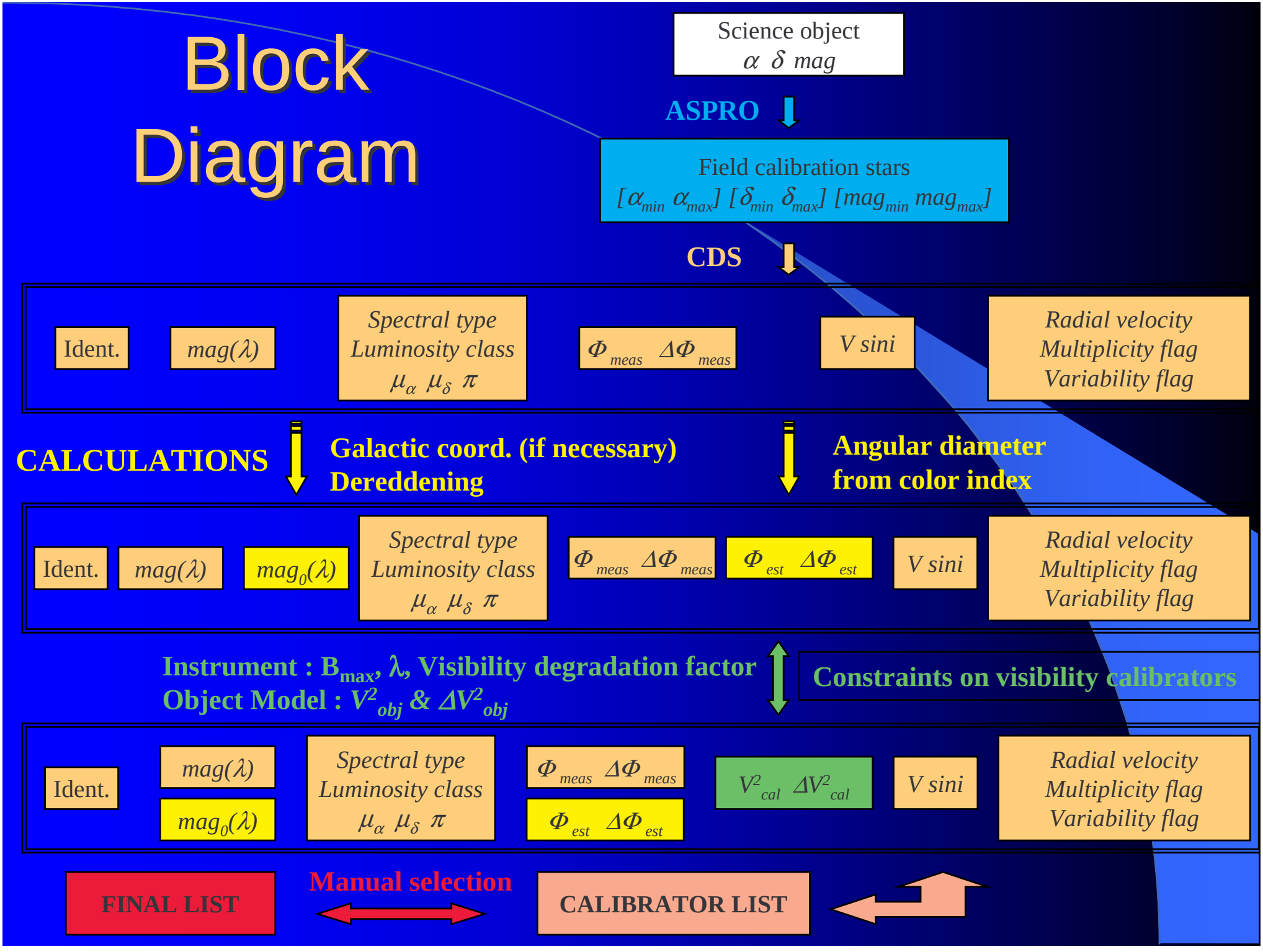
Technical Group

- J.-M. Clausse, Project Manager (OCA)
- Coding : P. Wilson, OCA
- ASPRO interface :
  - G. Duvert, LAOG
  - G. Zins, LAOG
- CDS interface :
  - F. Ochsenbein

In charge of the development :

- Coding
- Tests and corrections
- Technical documentation

Block Diagram



Catalogues

- **I/280 :** All-sky Compiled Catalogue of 2.5 million stars (limiting magnitude V=12-14) merging of Hipparcos- Tycho family catalogues (Kharchenko 2001)
- **I/196 :** Hipparcos Input Catalogue, Version 2 (Turon+ 1993)
- **II/7A :** UBVRIJKLMNH Photoelectric Catalogue (Morel+ 1978)
- **II/225 :** Catalog of Infrared Observations, Edition 5 (Gezari+ 1999)
- **J/A+A/386/492 :** Catalog of High Angular Resolution Measurements (Richichi, 2002)
- **V/50 :** Bright Star Catalogue, 5th Revised Ed. (Hoffleit+, 1991)
- **V/36B :** Supplement to the Bright Star Catalogue (Hoffleit+ 1983)
- **B/2mass :** The 2MASS database (IPAC/UMass, 2000)

V-based scenario parameters

Name	UCD	Comments	Catalog 1	Catalog 2	Catalog 3
DEJ2000	POS_EQ_DEC_MAIN	Declination IRCS 2000	I/280		
RAJ2000	POS_EQ_RA_MAIN	Right Ascension IRCS 2000	I/280		
DM	ID_ALTERNATIVE	DM number	I/280		
HD	ID_ALTERNATIVE	HD number	I/280		
HIP	ID_ALTERNATIVE	HIP number	I/280		
PmRa	POS_EQ_PMRA	Proper Motion in Right Ascension	I/280		
PmDec	POS_EQ_PMDEC	Proper Motion in Declination	I/280		
ParTrig	POS_PARLX_TRIG	Trigonometric Parallax	I/280		
Sp	SPECT_TYPE_GENERAL	Spectrum Classification	I/280		
Vmag	PHOT_JHN_V	Johnson magnitude V (555nm)	I/280	II/7A	
Bmag	PHOT_JHN_B	Johnson magnitude B (450nm)	I/280	II/7A	
VarFlag	CODE_VARIAB	v1=known variability GCVS/NSV	I/280		
MultFlag	CODE_MULTI_FLAG	d5=double/multi system flag	I/280		
GLat	POS_GAL_LAT	Galactic Latitude	I/196/main if Vmag ≤ 10	B/2mass/out	
GLon	POS_GAL_LON	Galactic Longitude	I/196/main if Vmag ≤ 10	B/2mass/out	
RadVel	VELOC_HC	Heliocentric Radial Velocity	I/196/main if Vmag ≤ 10		
Rmag	PHOT_JHN_R	Johnson magnitude R (700nm)	II/7A		
Imag	PHOT_JHN_I	Johnson magnitude I (870nm)	II/7A		
Jmag	PHOT_JHN_J	Johnson magnitude J (1.25mu) , DENIS (1.25)	II/225/CIO	II/7A	
Hmag	PHOT_JHN_H	Johnson magnitude H (1.62mu)	II/225/CIO	II/7A	
Kmag	PHOT_JHN_K	Johnson magnitude K (2.2mu)	II/225/CIO	II/7A	B/2mass/out
Nmag	PHOT_JHN_N	Johnson flux magnitude N (9.0mu)	II/7A		
LD	EXTENSION_DIAM	LD angular diameter	J/A+A/386/492/charm		
e_LD	ERROR	Error on LD Diam	J/A+A/386/492/charm		
UD	EXTENSION_DIAM	UD angular diameter	J/A+A/386/492/charm		
e_UD	ERROR	Error on UD Diam	J/A+A/386/492/charm		
Instr	OBS_METHOD	Observation method	J/A+A/386/492/charm		
Vsini	VELOC_ROTAT	Rotational velocity	V/50/catalog V≤ 6.5	V/36B 6.5<V≤7.1	
E(B-V)	PHOT_COLOR_EXCESS	color excess (not just E(B-V)			

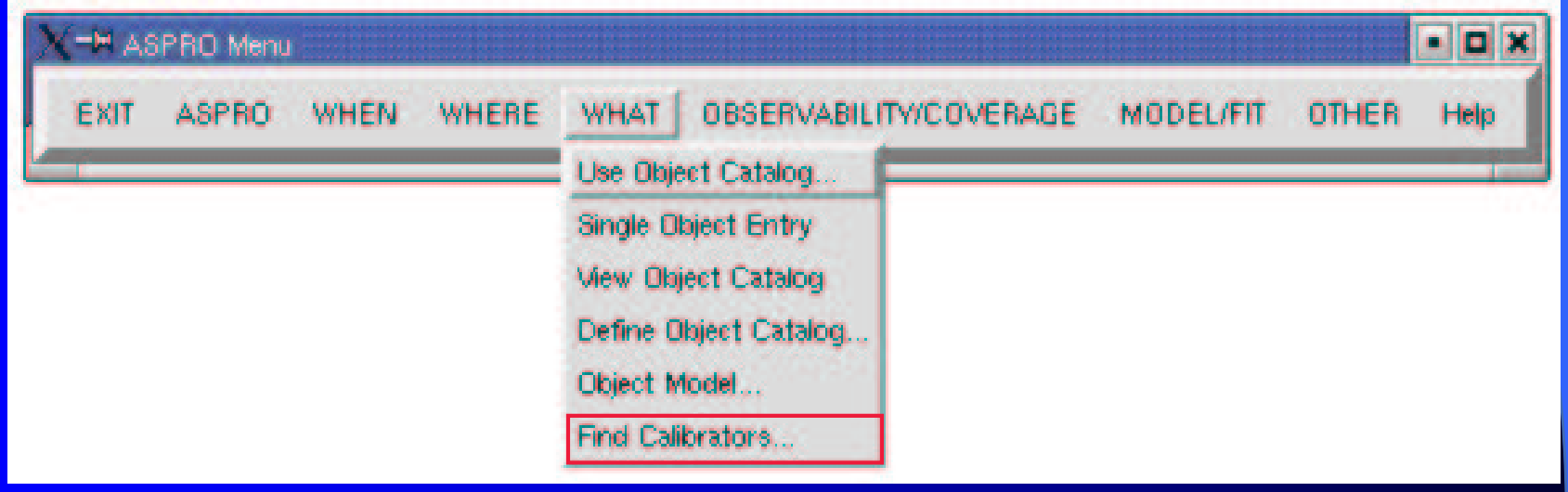
K-based scenario parameters

Name	UCD	Comments	Catalog 1	Catalog 2	Catalog 3
DEJ2000	POS_EQ_DEC_MAIN	Declination IRCS 2000	II/225/CIO		
RAJ2000	POS_EQ_RA_MAIN	Right Ascension IRCS 2000	II/225/CIO		
Jmag	PHOT_JHN_J	Johnson magnitude J (1.25mu) , DENIS (1.25)	II/225/CIO	II/7A	
Hmag	PHOT_JHN_H	Johnson magnitude H (1.62mu)	II/225/CIO	II/7A	
Kmag	PHOT_JHN_K	Johnson magnitude K (2.2mu)	II/225/CIO	II/7A	B/2mass/out
DM	ID_ALTERNATIVE	DM number	I/280		
HD	ID_ALTERNATIVE	HD number	I/280		
HIP	ID_ALTERNATIVE	HIP number	I/280		
PmRa	POS_EQ_PMRA	Proper Motion in Right Ascension	I/280		
PmDec	POS_EQ_PMDEC	Proper Motion in Declination	I/280		
ParTrig	POS_PARLX_TRIG	Trigonometric Parallax	I/280		
Sp	SPECT_TYPE_GENERAL	Spectrum Classification	I/280		
Vmag	PHOT_JHN_V	Johnson magnitude V (555nm)	I/280	II/7A	
Bmag	PHOT_JHN_B	Johnson magnitude B (450nm)	I/280	II/7A	
VarFlag	CODE_VARIAB	v1=known variability GCVS/NSV	I/280		
MultFlag	CODE_MULTI_FLAG	d5=double/multi system flag	I/280		
GLat	POS_GAL_LAT	Galactic Latitude	I/196/main if Vmag ≤ 10	B/2mass/out	
GLon	POS_GAL_LON	Galactic Longitude	I/196/main if Vmag ≤ 10	B/2mass/out	
RadVel	VELOC_HC	Heliocentric Radial Velocity	I/196/main if Vmag ≤ 10		
Rmag	PHOT_JHN_R	Johnson magnitude R (700nm)	II/7A		
Imag	PHOT_JHN_I	Johnson magnitude I (870nm)	II/7A		
Nmag	PHOT_JHN_N	Johnson flux magnitude N (9.0mu)	II/7A		
LD	EXTENSION_DIAM	LD angular diameter	J/A+A/386/492/charm		
e_LD	ERROR	Error on LD Diam	J/A+A/386/492/charm		
UD	EXTENSION_DIAM	UD angular diameter	J/A+A/386/492/charm		
e_UD	ERROR	Error on UD Diam	J/A+A/386/492/charm		
Instr	OBS_METHOD	Observation method	J/A+A/386/492/charm		
Vsini	VELOC_ROTAT	Rotational velocity	V/50/catalog V≤ 6.5	V/36B 6.5<V≤7.1	
E(B-V)	PHOT_COLOR_EXCESS	color excess (not just E(B-V)			

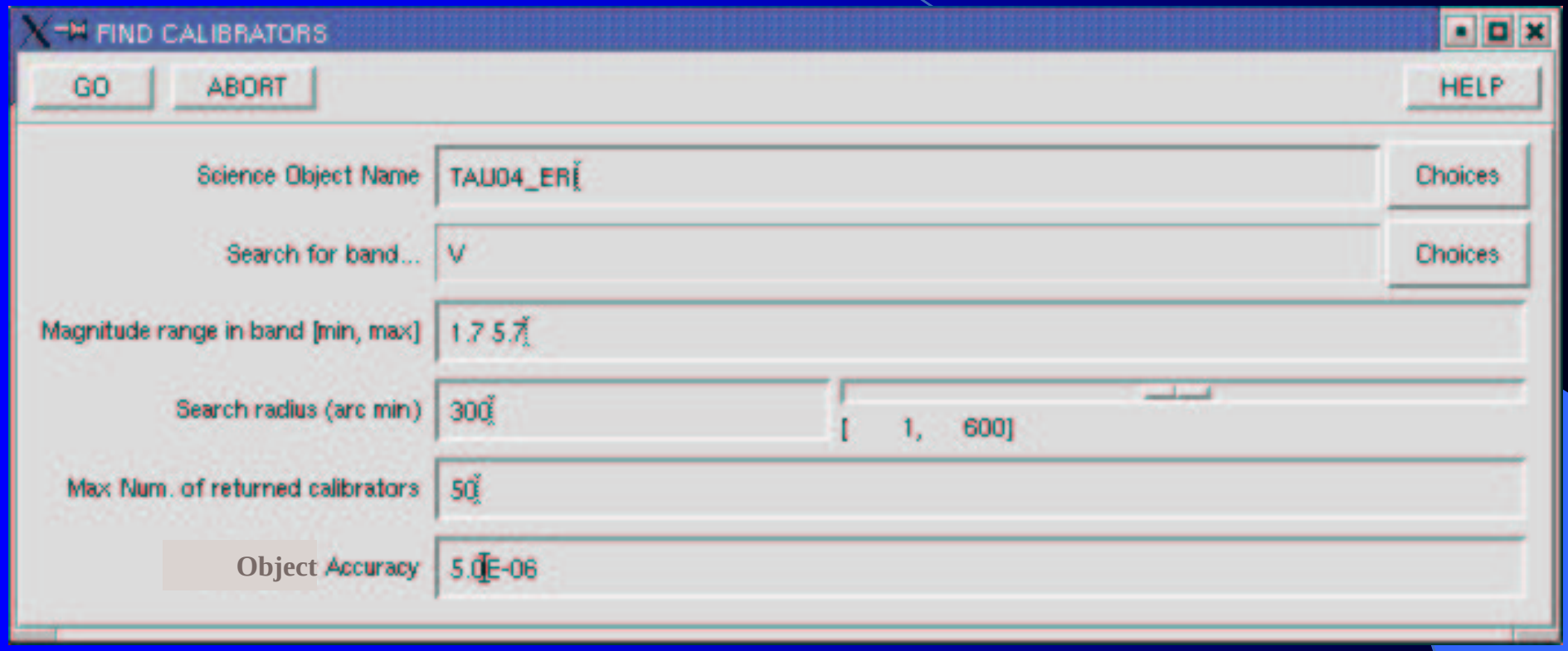
ASPRO environment

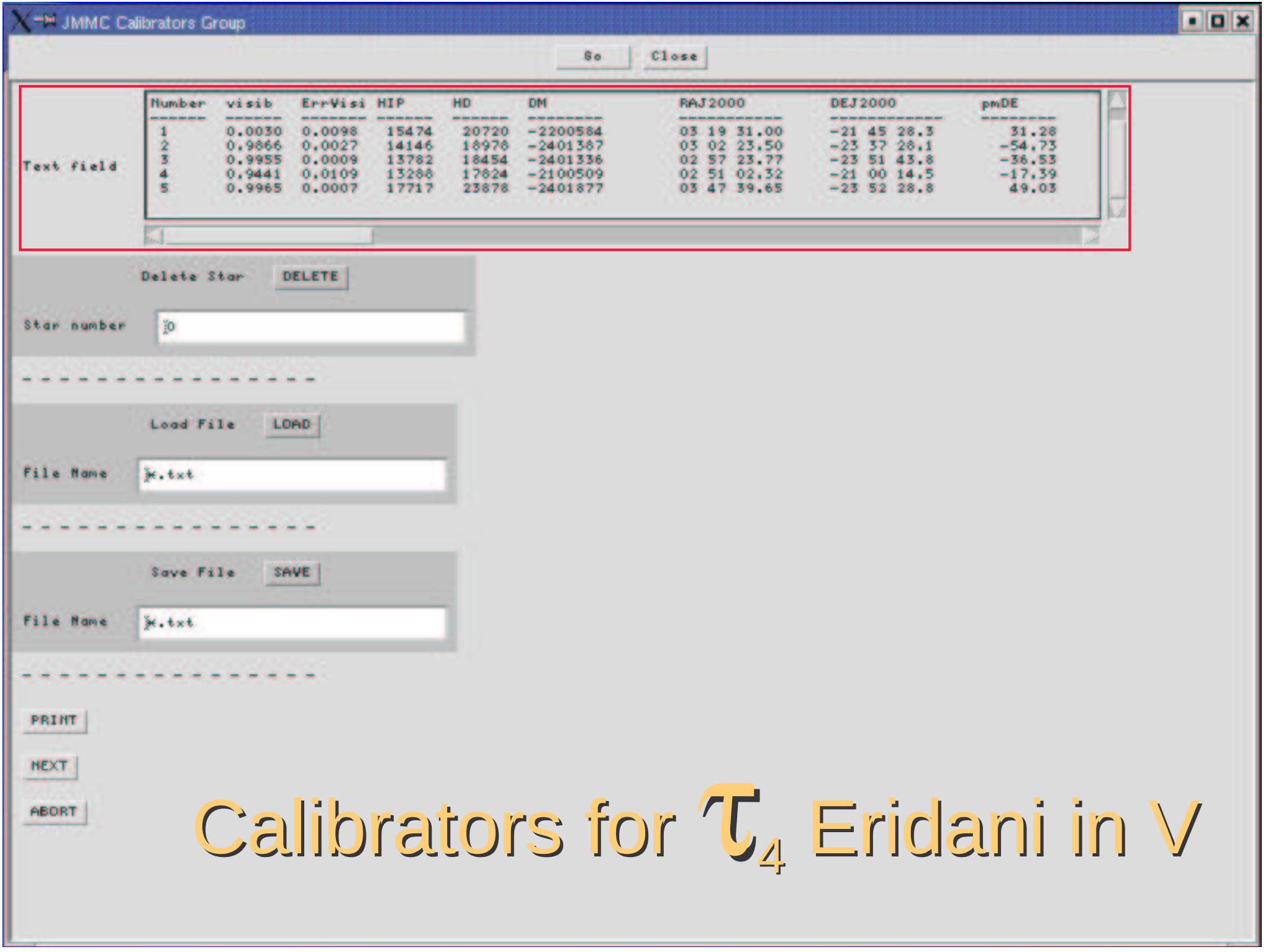
ASPRO : A Software to PRepare Observation

ASPRO helps you to prepare observations on optical or radio interferometers. It shows the constraints due to the geometry of the array and of the object's position on the sky and enable you to optimize your observing time. It knows a fair number of models for your favorite object , **find its calibrators** and can mimic real observations with a number of focal instruments, enabling you to evaluate the S/N ratio you can expect from the observations, and if your object's model is accurately bracketed by the observations.



Searching for a calibrator in V



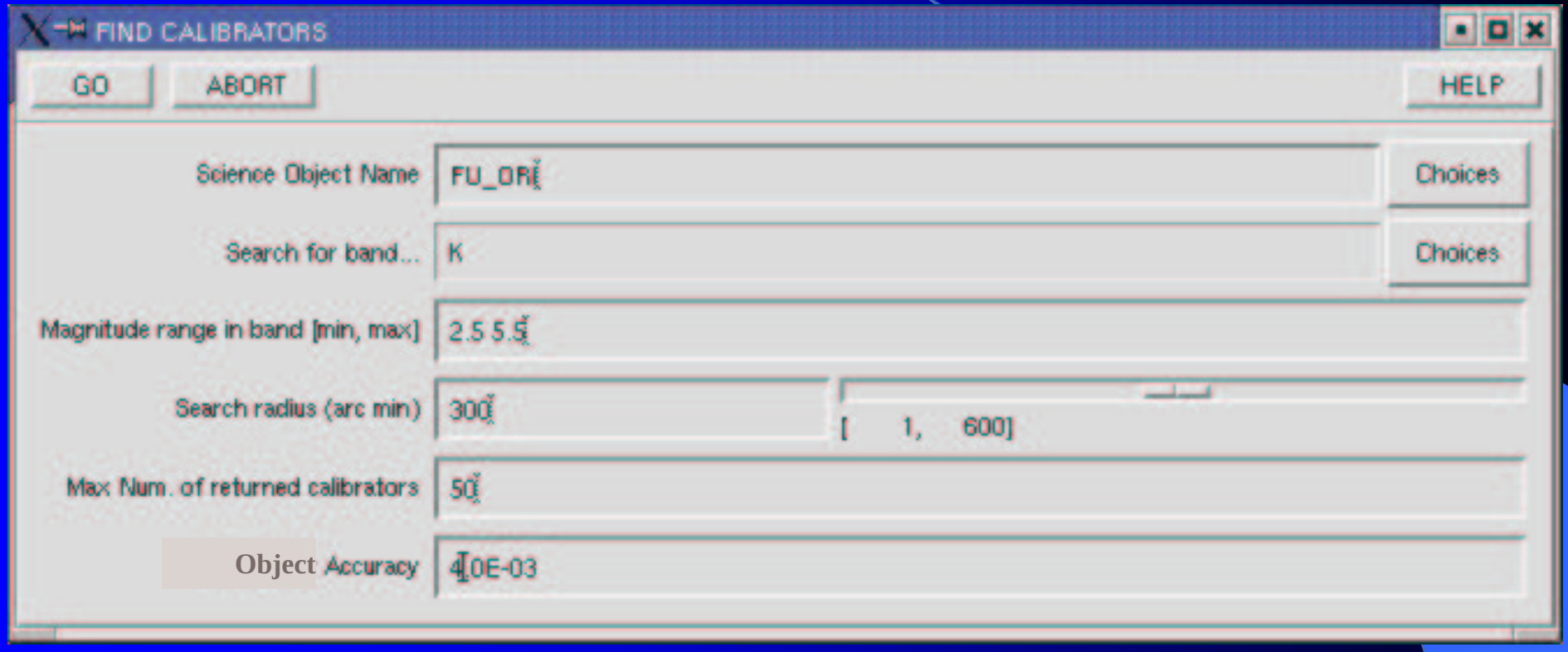


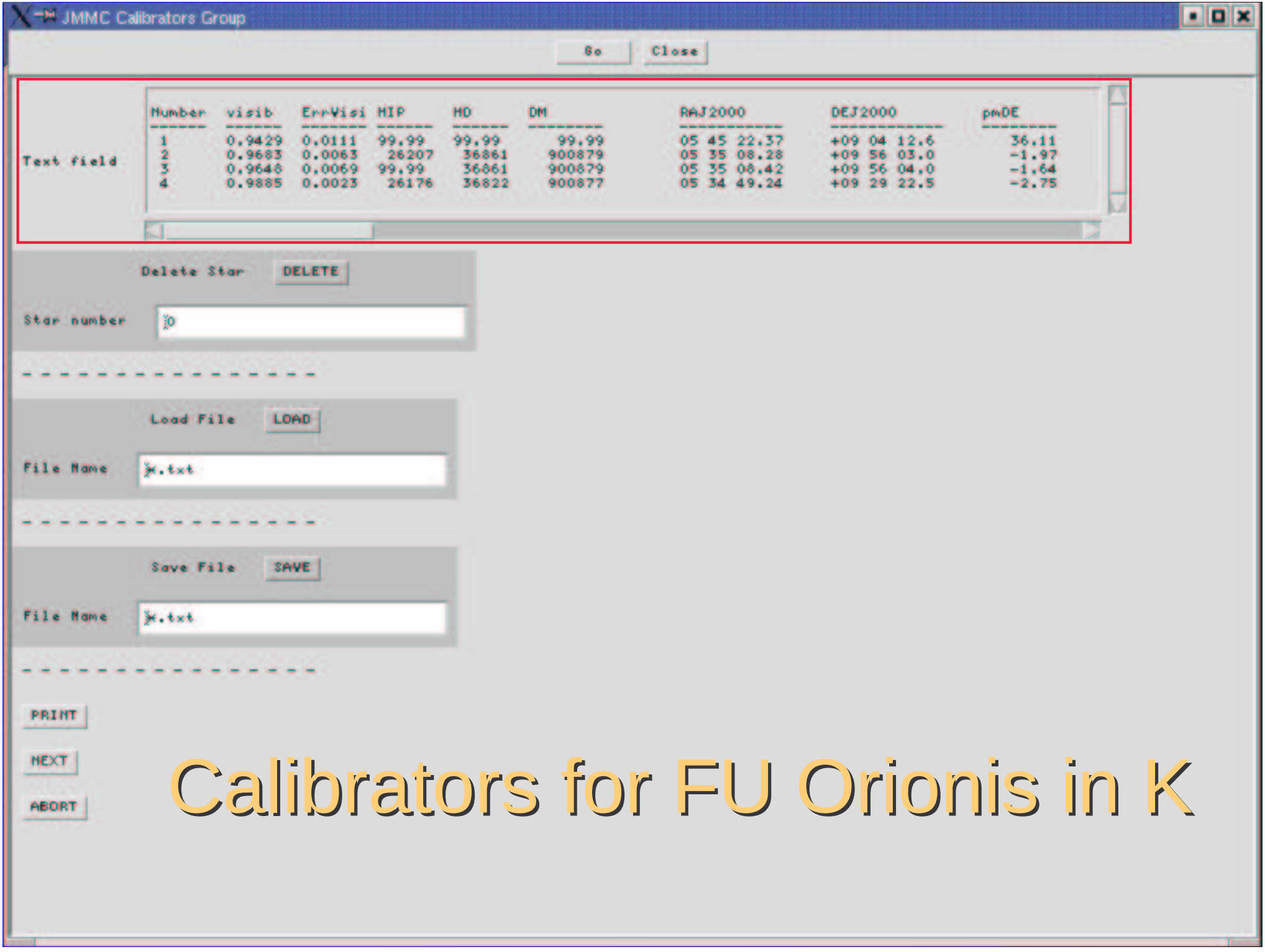
Calibrators for τ_4 Eridani in V

τ_4 Eridani V-calibrator parameters

number	1	2	3	4	5
visib	0.0030	0.9866	0.9955	0.9441	0.9965
ErrVisi	0.0098	0.0027	0.0009	0.0109	0.0007
HIP	15474	14146	13782	13288	17717
HD	20720	18978	18454	17824	23878
DM	-2200584	-2401387	-2401336	-2100509	-2401877
RAJ2000	03:19:31.00	03:02:23.50	02:57:23.77	02:51:02.32	03:47:39.65
DEJ2000	-21:45:28.3	-23:37:28.1	-23:51:43.8	-21:00:14.5	-23:52:28.8
pmDE	31.28	-54.73	-36.53	-17.39	49.03
pmRA	50.94	-145.18	102.10	-42.04	45.96
Plx	12.38	37.89	20.82	17.75	11.74
SpType	M3/M4III	A4V	A5IV/V	K0III	A1V
VFlag	G	99.99	99.99	99.99	99.99
MFlag	V	99.99	99.99	99.99	99.99
GLAT	-56.00	-60.30	-61.46	-62.09	-50.30
GLON	212.09	213.54	213.46	206.80	218.37
RadVel	41.7	-9.8	28.8	-8.6	29.0
LD	99.99	99.99	99.99	99.99	99.99
e_LD	99.99	99.99	99.99	99.99	99.99
UD	99.99	99.99	99.99	99.99	99.99
e_UD	99.99	99.99	99.99	99.99	99.99
Meth	99.99	99.99	99.99	99.99	99.99
Lambda	99.99	99.99	99.99	99.99	99.99
U	7.130	4.330	99.99	6.280	99.99
B	5.313	4.272	5.695	5.679	5.321
V	3.736	4.086	5.433	4.767	5.235
R	2.120	3.960	99.99	4.070	99.99
I	0.660	3.870	99.99	3.600	99.99
J	-0.070	3.778	99.99	3.264	99.99
H	99.99	3.680	99.99	2.770	99.99
K	-1.170	3.667	4.889	2.682	5.051
L	99.99	99.99	99.99	2.640	99.99
M	99.99	99.99	99.99	99.99	99.99
N	99.99	99.99	99.99	99.99	99.99
RotVel	99.99	144	81	99.99	0
E(B-V)	99.99	99.99	99.99	99.99	99.99
M0	99.990	99.990	99.990	99.990	99.990
L0	99.990	99.990	99.990	2.639	99.990
K0	-1.173	3.666	4.887	2.680	5.048
H0	99.990	3.679	99.990	2.767	99.990
J0	-0.077	3.776	99.990	3.259	99.990
I0	0.648	3.866	99.990	3.592	99.990
R0	2.102	3.954	99.990	4.058	99.990
V0	3.712	4.078	5.419	4.750	5.210
diam_bv	6.574	0.669	0.405	1.462	0.337
diam_vr	13.176	0.554	99.990	1.560	99.990
diam_vk	10.219	0.661	0.384	1.362	0.337
ErrD_vk	1.022	0.066	0.038	0.136	0.034
mult	1.000	1.000	1.000	1.000	1.000

Searching for a calibrator in K





Calibrators for FU Orionis in K

FU Orionis K-calibrator parameters

number	1	2	3	4
visib	0.9429	0.9683	0.9648	0.9885
ErrVisi	0.0111	0.0063	0.0069	0.0023
HIP	99.99	26207	99.99	26176
HD	99.99	36861	36861	36822
DM	99.99	900879	900879	900877
RAJ2000	05:45:22.37	05:35:08.28	05:35:08.42	05:34:49.24
DEJ2000	+09:04:12.6	+09:56:03.0	+09:56:04.0	+09:29:22.5
pmDE	36.11	-1.97	-1.64	-2.75
pmRA	9.90	-1.30	18.90	0.43
Plx	-7.59	3.08	99.99	3.57
SpType	F8	O...	O	B0IV...
VFlag	G	99.99	99.99	99.99
MFlag	99.99	C	99.99	99.99
GLAT	-10.25	-11.99	-11.99	-12.29
GLON	197.11	195.05	195.05	195.40
RadVel	99.99	32.9	32.9	33.2
LD	99.99	99.99	99.99	99.99
e_LD	99.99	99.99	99.99	99.99
UD	1.55	99.99	99.99	99.99
e_UD	99.99	99.99	99.99	99.99
Meth	LBI	99.99	99.99	99.99
Lambda	K	99.99	99.99	99.99
U	99.99	2.170	2.170	3.290
B	10.773	3.355	3.653	4.241
V	9.447	3.532	3.882	4.402
R	99.99	3.460	3.460	4.420
I	99.99	3.630	3.630	4.590
J	99.99	3.780	3.780	4.810
H	5.210	99.99	99.99	99.99
K	4.650	3.930	3.930	4.980
L	99.99	99.99	99.99	4.970
M	99.99	99.99	99.99	99.99
N	99.99	99.99	99.99	99.99
RotVel	99.99	66	66	39
E(B-V)	99.99	99.99	99.99	99.99
M0	99.990	99.990	99.990	99.990
L0	99.990	99.990	99.990	4.963
K0	99.990	3.913	3.930	4.966
H0	99.990	99.990	99.990	99.990
J0	99.990	3.740	3.779	4.777
I0	99.990	3.557	3.629	4.530
R0	99.990	3.352	3.458	4.331
V0	99.990	3.388	3.880	4.283
diam_bv	0.322	0.475	0.371	0.327
diam_vr	99.990	0.635	1.195	0.338
diam_vk	0.699	0.518	0.546	0.311
ErrD_vk	0.070	0.052	0.055	0.031
mult	1.000	1.000	1.000	1.000

Next improvements

- Debugging and tests in progress
- User Manual to be written
- Included in ASPRO (available via Web from March 03)
- First version suitable for bright source calibrator research (e.g. VINCI)
- Next version for faint sources on Nov. 2003 (e.g. AMBER)
  - Release constraint on magnitude knowledge (presently V & K)
  - Complete the photometry (table color index - spectral type)
  - Study error propagation on diameter calculation
  - Release constraint on parallax knowledge (for dereddening)

End of the presentation. Thank you for your attention.

JMMC

We interfere
constructively

Web site at http://www-laog.obs.ujf-grenoble.fr/~jmmc/

Mirror site at http://grasse.obs-azur.fr/jmmc/