DM1:

Domain model for source catalogues (and time series?)

ra	dec	u	g	r	i	z	run	rerun	camcol		
319.42017295	-2.91605515	19.453272	17.512213	16.457823	15.911284	15.466995	8083	301	5	45	
319.6726666	-2.89320328	18.006258	18.408295	17.027491	16.594183	15.47355	8083	301	5	47	
51.95792979	0.44178806	17.90674	16.767498	16.243202	16.038309	15.933592	3438	301	5	146	
52.15864799	0.5100779	18.619341	17.314531	16.763399	16.53455	16.394312	3438	301	5	148	
52.72667419	0.88746662	17.930399	16.900446	16.418163	16.214106	16.1061	3438	301	6	152	
52.85661769	0.97756273	18.178764	16.997499	16.512629	16.314194	16.207306	3438	301	6	152	
202.55299093	39.86892911	17.820675	16.164869	15.296254	14.812856	14.419583	3919	301	1		
52.05059022	0.14966321	19.351822	18.277271	18.06134	17.999191	17.999123	4136	301	4		
158.78373508	63.9613952	19.283352	17.41073	16.419657	16.042131	15.731997	1350	301	1	295	
158.82992158	63.94061555	19.297565	17.409573	16.431635	16.044048	15.707916	1350	301	1		

The Hipparcos and Tycho Catalogues (ESA 1997)

The Hipparcos Main Catalogue (118218 rows)

Gerard Lemson, JHU 2017-10-27

LOTS of astronomical information is already, or well be available in the form of very large source catalogues.

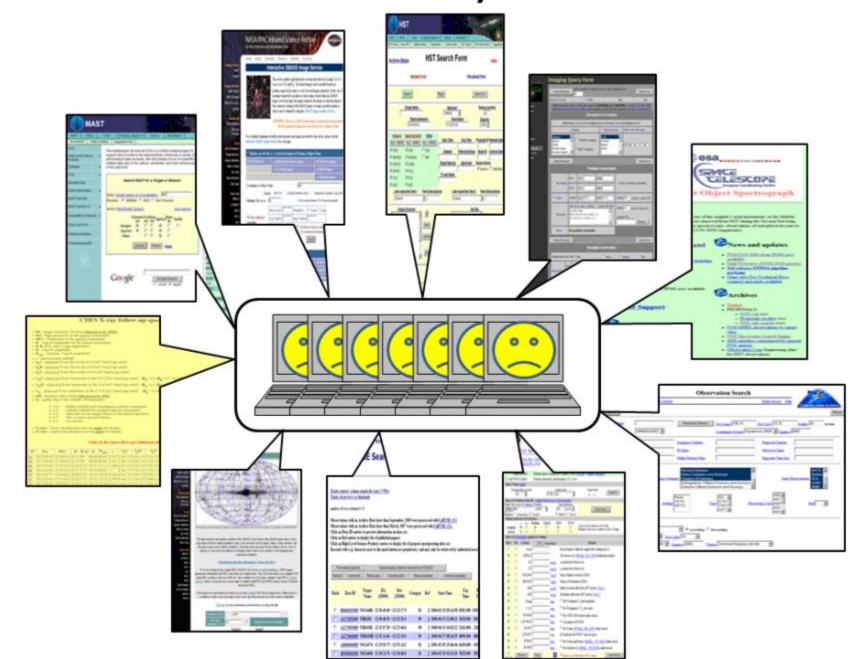
Generally in survey specific schemas.

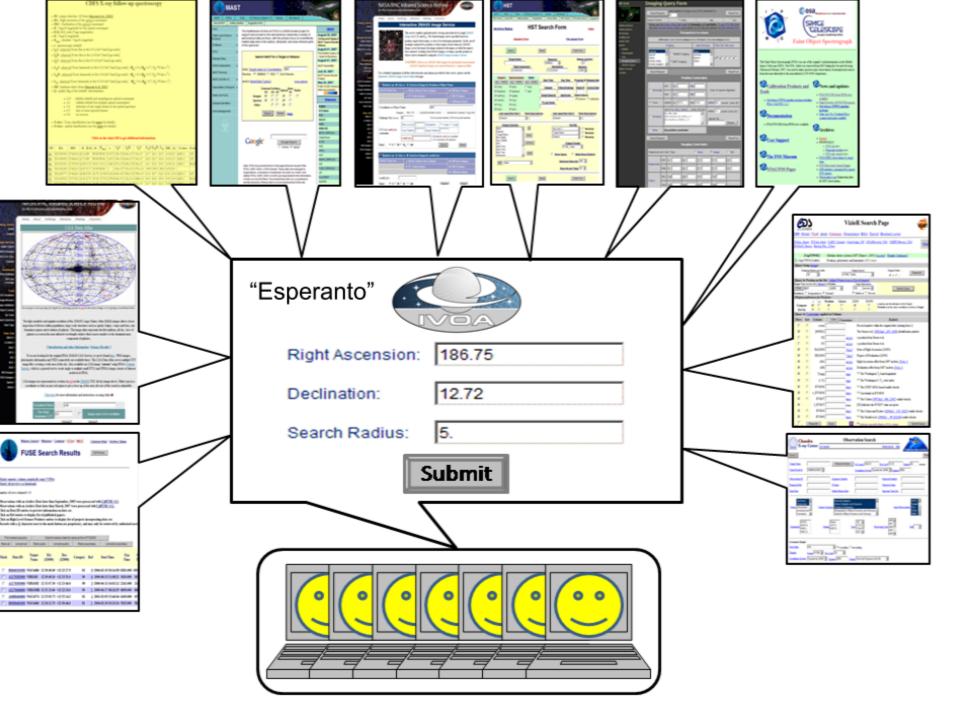
We should be able to match them together.

I think the IVOA needs a common data model for source catalogues.

Reminder: Why data modelling in the IVOA?

Goal of VO: resolve Babylonian confusion





Data models do this for archives, by helping in ...

- Understanding common components in diverse, structured data sets.
 - Using semantically expressive entities
- Posing correct and meaningful queries.
 - To lots of archives at once, without enforcing common (tap_)schema
- Understanding query results.
- Understanding the world of the IVOA, its "universe of discourse"

Stages in a data modelling effort

Analysis

Logical

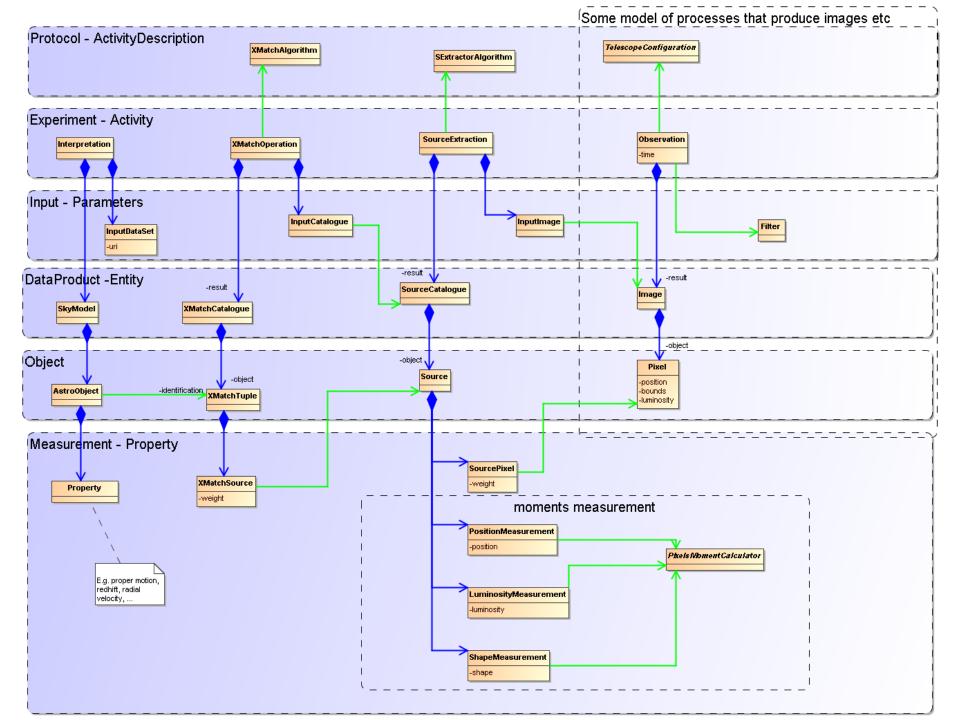
Physical

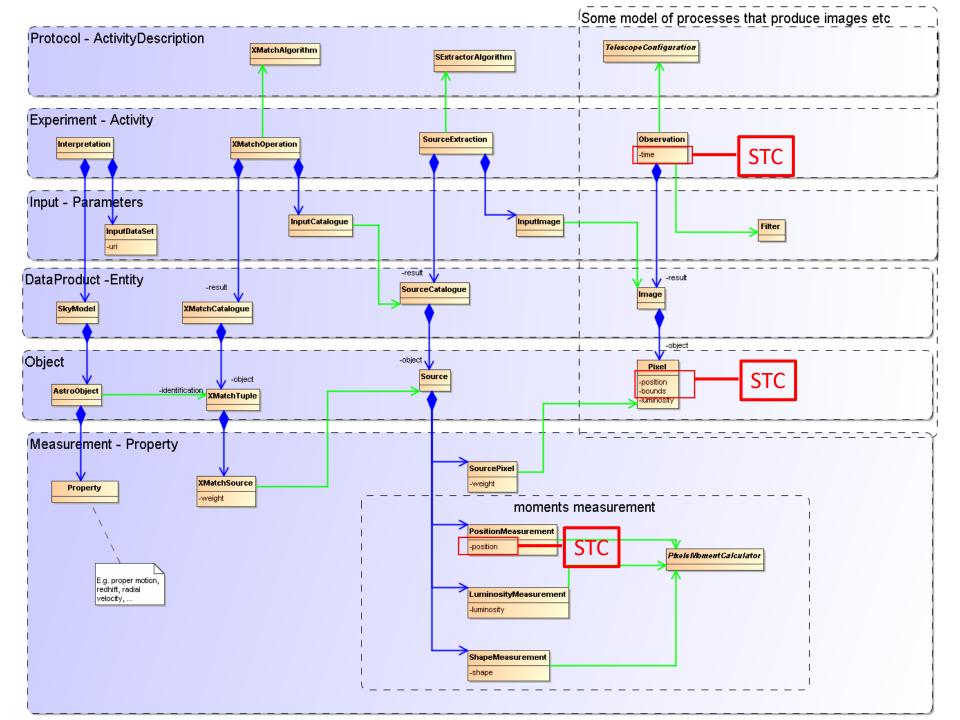
Analysis phase

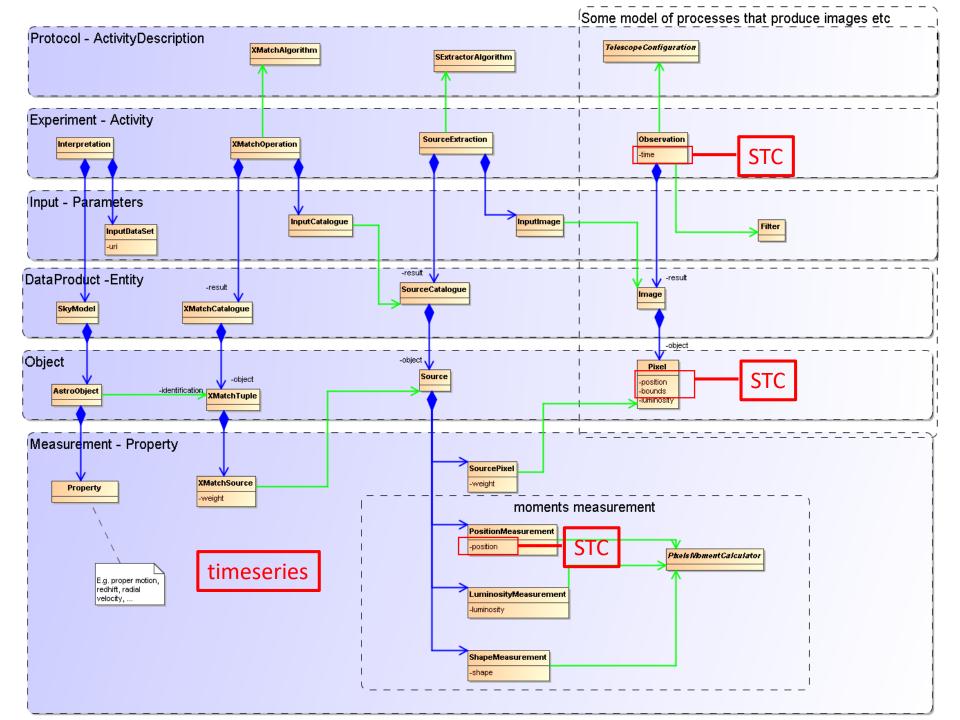
• Domain model of the "universe of discourse"

Normalized, but not many details

Where does what go?







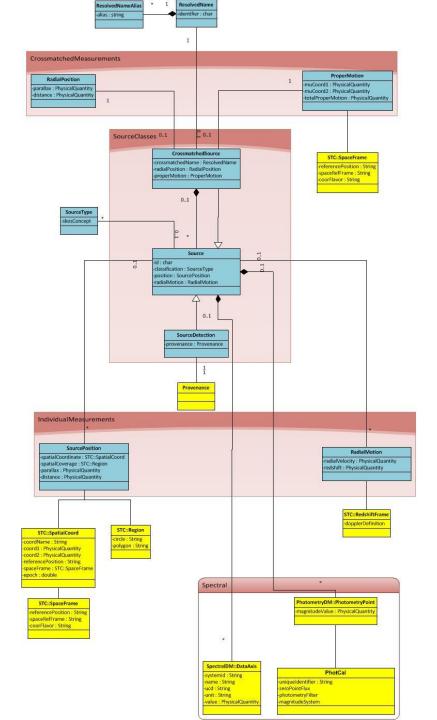
Logical Modelling

Application specific

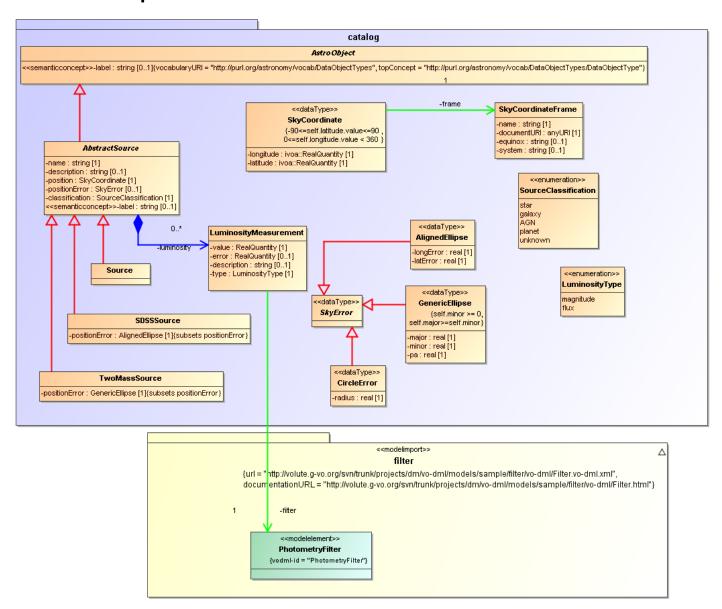
• Full details

• Implementation agnostic: VO-DML

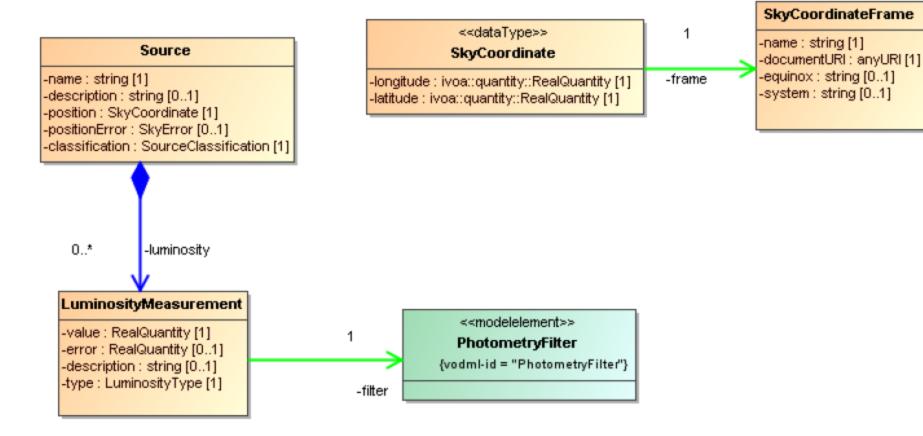
Salgado etal, standards effort in progress(?)



Sample ("toy") source data model used in VO-DML spec



Even simpler



Physical representations

Implementation: TAP for example

For interpretation using logical representation:
 Mapping

2macc	
2mass	

	designation	ral	deal	clon	- clati	err medi	err minler	e seel	4	d countries	metaconi	j snr	h ml	b consider!	h msigcon
						_	err_min er	_	_		_msigcom		_	_	_
	char	double	double	char	char	double	double	int	double	double	double	double	double	double	double
		deg	deg			arcsec		deg	mag	mag	mag		mag	mag	mag
	null	null	null	null	null	null	null	null	null	null	null	null	null	null	null
	00424416+4116152	10.684029	41.270901	00h42m44.17s	41d16m15.24s	0.13	0.12	111	10.063	null	null	null	9.359	null	null
	00424414+4116000	10.683944	41.266682	00h42m44.15s	41d16m00.06s	0.13	0.12	93	12.565	0.054	0.055	306.5	9.510	null	null
	00424377+4116045	10.682383	41.267925	00h42m43.77s	41d16m04.53s	0.10	0.09	69	12.446	0.060	0.061	342.0	11.753	0.062	0.063
	00424484+4116145	10.686846	41.270714	00h42m44.84s	41d16m14.57s	0.13	0.11	61	12.872	0.060	0.061	231.0	9.433	null	null
	00424487+4116005	10.686963	41.266827	00h42m44.87s	41d16m00.58s	0.10	0.09	93	10.450	null	null	null	12.094	0.032	0.033
	00424502+4116130	10.687611	41.270302	00h42m45.03s	41d16m13.09s	0.18	0.14	173	13.055	0.108	0.109	195.2	9.504	null	null
	00424446+4116016	10.685270	41.267124	00h42m44.46s	41d16m01.65s	0.13	0.12	90	12.070	0.033	0.035	483.5	9.301	null	null
	00424464+4116106	10.686015	41.269630	00h42m44.64s	41d16m10.67s	0.13	0.12	90	9.399	null	null	null	9.985	0.070	0.070
	00424464+4116092	10.686026	41.269226	00h42m44.65s	41d16m09.21s	0.13	0.12	90	9.299	null	null	null	8.606	null	null
	00424403+4116108	10.683465	41.269676	00h42m44.03s	41d16m10.83s	0.13	0.11	119	11.507	0.055	0.056	812.1	8.744	null	null
	00424433+4116085	10.684737	41.269035	00h42m44.34s	41d16m08.53a	0.08	0.07	87	9.453	0.051	0.052	5385.6	8.668	0.050	0.051
	00424455+4116103	10.685657	41.269550	00h42m44.56s	41d16m10.38s	0.13	0.12	90	10.773	0.067	0.069	1596.7	8.532	null	null
	00424497+4116034	10.687414	41.267632	00h42m44.98s	41d16m03.48s	0.13	0.12	93	12.371	0.034	0.036	366.5	9.627	null	null
	00424420+4116009	10.684180	41.266941	00h42m44.20s	41d16m00.99s	0.13	0.12	101	10.065	null	null	null	9.374	null	null
	00424386+4116123	10.682777	41.270111	00h42m43.87s	41d16m12.40s	0.10	0.09	111	9.977	null	null	null	11.683	0.056	0.056
	00424398+4116028	10.683263	41.267456	00h42m43.98s	41d16m02.84s	0.13	0.12	79	12.136	0.038	0.040	455.0	9.226	null	null
	00424385+4116014	10.682713	41.267056	00h42m43.85s	41d16m01.40s	0.13	0.12	69	10.176	null	null	null	11.876	0.049	0.050
		** ******	41 000000	00540-44 00-	**********		0.10		0.000				0.000		
_															

sdss

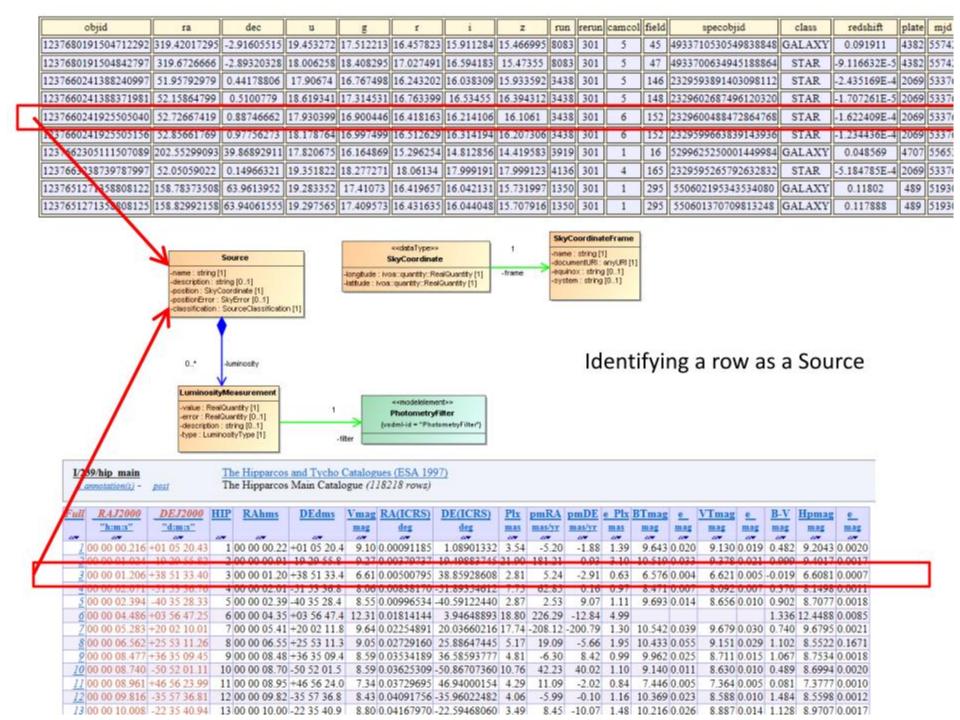
objid	ra	dec	u	g	r	i	z	run	rerun	camcol	field	specobjid	class	redshift	plate
1237680191504712292	319.42017295	-2.91605515	19.453272	17.512213	16.457823	15.911284	15.466995	8083	301	5	45	4933710530549838848	GALAXY	0.091911	4382
1237680191504842797	319.6726666	-2.89320328	18.006258	18.408295	17.027491	16.594183	15.47355	8083	301	5	47	4933700634945188864	STAR	-9.116632E-5	4382
1237660241388240997	51.95792979	0.44178806	17.90674	16.767498	16.243202	16.038309	15.933592	3438	301	5	146	2329593891403098112	STAR	-2.435169E-4	2069
1237660241388371981	52.15864799	0.5100779	18.619341	17.314531	16.763399	16.53455	16.394312	3438	301	5	148	2329602687496120320	STAR	-1.707261E-5	2069
1237660241925505040	52.72667419	0.88746662	17.930399	16.900446	16.418163	16.214106	16.1061	3438	301	6	152	2329600488472864768	STAR	-1.622409E-4	206
1237660241925505156	52.85661769	0.97756273	18.178764	16.997499	16.512629	16.314194	16.207306	3438	301	6	152	2329599663839143936	STAR	-1.234436E-4	206
1237662305111507089	202.55299093	39.86892911	17.820675	16.164869	15.296254	14.812856	14.419583	3919	301	1	16	5299625250001449984	GALAXY	0.048569	470
1237663238739787997	52.05059022	0.14966321	19.351822	18.277271	18.06134	17.999191	17.999123	4136	301	4	165	2329595265792632832	STAR	-5.184785E-4	206
1237651271358808122	158.78373508	63.9613952	19.283352	17.41073	16.419657	16.042131	15.731997	1350	301	1	295	550602195343534080	GALAXY	0.11802	489
1237651271358808125	158.82992158	63.94061555	19.297565	17.409573	16.431635	16.044048	15.707916	1350	301	1	295	550601370709813248	GALAXY	0.117888	489

I/239/hip main
| amotation(s) - post

The Hipparcos and Tycho Catalogues (ESA 1997) The Hipparcos Main Catalogue (118218 rows)

hipparcos @vizier

$F\iota$	II RAJ2000	DEJ2000	HIP	RAhms	DEdms	Vmag	RA(ICRS)	DE(ICRS)	Plx	pmRA	pmDE	e Plx	BTmag	<u>e</u>	VTmag	e	B-V	Hpmag	<u>e</u>
	"h:m:s"	"d:m:s"				mag	deg	deg	mas	mas/yr	mas/yr	mas	mag	mag	mag	mag	mag	mag	mag
-00	_ AF	∆ ™	AF	ΔΨ	ΔΨ	47	ΔΨ	ΔΨ	47	ΔΨ	Δ.Ψ	44	47	44	Δ.Ψ	44	44	ΔΨ	20
	1 00 00 00.216	+01 05 20.43	1	00 00 00.22	+01 05 20.4	9.10	0.00091185	1.08901332	3.54	-5.20	-1.88	1.39	9.643	0.020	9.130	0.019	0.482	9.2043	0.0020
	2 00 00 01.024	-19 29 55.82	2	00 00 00.91	-19 29 55.8	9.27	0.00379737	-19.49883745	21.90	181.21	-0.93	3.10	10.519	0.033	9.378	0.021	0.999	9.4017	0.0017
	3 00 00 01.206	+38 51 33.40	3	00 00 01.20	+38 51 33.4	6.61	0.00500795	38.85928608	2.81	5.24	-2.91	0.63	6.576	0.004	6.621	0.005	-0.019	6.6081	0.0007
	4 00 00 02.071	-51 53 36.76	4	00 00 02.01	-51 53 36.8	8.06	0.00838170	-51.89354612	7.75	62.85	0.16	0.97	8.471	0.007	8.092	0.007	0.370	8.1498	0.0011
	5 00 00 02.394	-40 35 28.33	5	00 00 02.39	-40 35 28.4	8.55	0.00996534	-40.59122440	2.87	2.53	9.07	1.11	9.693	0.014	8.656	0.010	0.902	8.7077	0.0018
	6 00 00 04.486	+03 56 47.25	6	00 00 04.35	+03 56 47.4	12.31	0.01814144	3.94648893	18.80	226.29	-12.84	4.99					1.336	12.4488	0.0085
	7 00 00 05.283	+20 02 10.01	7	00 00 05.41	+20 02 11.8	9.64	0.02254891	20.03660216	17.74	-208.12	-200.79	1.30	10.542	0.039	9.679	0.030	0.740	9.6795	0.0021
	8 00 00 06.562	+25 53 11.26	8	00 00 06.55	+25 53 11.3	9.05	0.02729160	25.88647445	5.17	19.09	-5.66	1.95	10.433	0.055	9.151	0.029	1.102	8.5522	0.1671
	9 00 00 08.477	+36 35 09.45	9	00 00 08.48	+36 35 09.4	8.59	0.03534189	36.58593777	4.81	-6.30	8.42	0.99	9.962	0.025	8.711	0.015	1.067	8.7534	0.0018
	00 00 08.740	-50 52 01.11	10	00 00 08.70	-50 52 01.5	8.59	0.03625309	-50.86707360	10.76	42.23	40.02	1.10	9.140	0.011	8.630	0.010	0.489	8.6994	0.0020
	00 00 08.961	+46 56 23.99	11	00 00 08.95	+46 56 24.0	7.34	0.03729695	46.94000154	4.29	11.09	-2.02	0.84	7.446	0.005	7.364	0.005	0.081	7.3777	0.0010
	2 00 00 09.816	-35 57 36.81	12	00 00 09.82	-35 57 36.8	8.43	0.04091756	-35.96022482	4.06	-5.99	-0.10	1.16	10.369	0.023	8.588	0.010	1.484	8.5598	0.0012
	3 00 00 10.008	-22 35 40.94	13	00 00 10.00	-22 35 40.9	8.80	0.04167970	-22.59468060	3.49	8.45	-10.07	1.48	10.216	0.026	8.887	0.014	1.128	8.9707	0.0017



objid	ra	dec	u	g	ſ	i	z	run	rerun	camcol	field	specobji	d	class	redshift	plate	mjd
1237680191504712292	319.42017295	-2.91605515	19.453272	17.512213	16.457823	15.911284	15.466995	8083	301	5	45	4933710530549	9838848	GALAXY	0.091911	4382	5574
1237680191504842797	319.6726666	-2.89320328	18.006258	18.408295	17.027491	16.594183	15.47355	8083	301	5	47	493370063494	5188864	STAR	-9.116632E-5	4382	5574
1237660241388240997	51.95792979	0.44178806	17.90674	16.767498	16.243202	16.038309	15.933592	3438	301	5	146	232959389140	3098112	STAR	-2.435169E-4	2069	5337
1237660241388371981	52.15864799	0.5100779	8.619341	17.314531	16.763399	16.53455	16.394312	3438	301	5	148	2329602687490	6120320	STAR	-1.707261E-5	2069	5337
1237660241925505040	52.72667419	0.88746662	7.930399	16.900446	16.418163	16.214106	16.1061	3438	301	6	152	2329600488472	2864768	STAR	-1.622409E-4	2069	5337
1237660241925505156	52.85661769	0.97756273	8.178764	16.997499	16.512629	16.314194	16.207306	3438	301	6	152	2329599663839	9143936	STAR	-1.234436E-4	2069	53370
1237662305111507089	202.55299093	39.86892911	7.820675	16.164869	15.296254	14.812856	14.419583	3919	301	1	16	529962525000	1449984	GALAXY	0.048569	4707	5565
1237663238739787997	52.05059022	0.14966321	9.351822	18.277271	18.06134	17.999191	17.999123	4136	301	4	165	2329595265792	2632832	STAR	-5.184785E-4	2069	53370
1237651271358808122	158.78373508	63.9613952	9.283352	17,41073	16.419657	16.042131	15.731997	1350	301	1	295	550602195343	534080	GALAXY	0.11802	489	5193
1237651271358808125	158.82992158	63.94061555	9.297565	17.409573	16.431635	16.044048	15.707916	1350	301	1	295	550601370709	813248	GALAXY	0.117888	489	5193
	 classification : 	SourceClassification	1[1]														
	-value : Real -error : Real -description	-luminosity /Measurement iccustity [1] Our tity [01] string [01] nosityType [1]	(E) (1) (A) (A)	(vo	<-modelelemen Photometryf i dml-i∉ = "Photo	Mer metryFilter*}				_		columi		s the I	Positio	n of	f a
L/239/hip man Lamotation() -	Luminosity -value : Rea -error : Real -description -type : Lumi	Measurement [Gustity [1] Outsity [01] string [01] nosityType [1] The Hipparcos The Hipparcos	and Tycho Main Catal	Catalogues	PhotometryFildmi-id = "Photo (ESA 1997	Mer metryFilter*}	So	urc	e, a	a Sk	yCo	oordina	te			n of	fa
The state of the s	Luminosity -value : Real -error : Real -description -type : Lumi	Measurement Cupity [1] Cupity [01] string [01] rosityType [1]	and Tycho	filter (vo	PhotometryFildmi-id = "Photo (ESA 1997	Mer metryFilter*}		urc	e, a	a Sk	yCo		te	s the I		n of	fa
Ful RAJ2000 "himis"	Luminosit -value ; Rea -error : Real -description -type : Luminosity DEJ2000 H	Measurement Couplity [1] Couplity [01] string [01] string [01] nosityType [1] The Hipparcos The Hipparcos	and Tycho Main Catal DEdms	Catalogues (1182	Photometryfil dml-id = "Photo (ESA 1997 118 rows) A(ICRS) deg	metryfilter) DE(ICRS) deg	So Pix pml mas mas	RA PO	mDE	e Plx B	YCo	e VImag	e B	Hpmag	e mag	n of	fa
Lannotation(2 -	Luminosit -value ; Rea -error : Real -description -type : Luminosity DEJ2000 H	Measurement Country [1] Country [01] string [01] rosstyType [1] The Hipparcos The Hipparcos	and Tycho Main Catal DEdms +01 05 20.4	Catalogues (1182 Vmag Ramag 9.10 0.0	Photometryfil dml-id = "Photo (ESA 1997 18 rows) A(ICRS) deg	metryFilter's DE(ICRS) deg	Plx pml mas or or 3.54 -5	RA po	e, a	e Plx B	Tmag	e VTmag mag mag mag 0.020 9.130	e B	Hpmag mag mag 482 9.2043	e mag	n of	fa
Tannotation(2 -	Luminosit -value : Real -error : Real -description -type : Lumi DEJ2000	The Hipparcos The Hipparcos The Hipparcos The O0 00 00.22 2 00 00 00.91 3 00 00 01.20	and Tycho Main Catal DEdms +01 05 20.4 -19 29 55.8 +38 51 33.4	Catalogues (1182 Vmag Ramag 4 9.10 0.0 3 9.27 0.0 4 6.61 0.0	(ESA 1997 il8 rows) A(ICRS) deg 00091185 00379737 -1 00500795 3	DE(ICRS) deg av 1.08901332 19.49883745 88.85928608	Pix pml mas mas as a 3.54 -5 21.90 181 2.81 5	RA pn 5.20	nDE -1.88 -0.93 -2.91	e Plx B	Tmag mag 9.643 0.519 6.576	e VTmag mag mag 0.020 9.130 0.033 9.378 0.004 6.621 0	e B mag m 0.019 0. 0.021 0. 0.005 -0.	Hpmag mag 482 9.2043 999 9.4017 019 6.6081	e mag 3 0.0020 7 0.0017 1 0.0007	n of	fa
Tannotation(2 -	Luminosit -value : Real -error : Real -description -type : Luminosit -description -descrip	The Hipparcos The Hipparcos The Hipparcos The O0 00 00.22 2 00 00 00.91 3 00 00 01.20 4 00 00 02.01	DEdms +01 05 20.4 -19 29 55.8 +38 51 33.4 -51 53 36.8	Catalogues (1182 Vmag Ramag 4 9.10 0.0 8 9.27 0.0 4 6.61 0.0 8 8.06 0.0	(ESA 1997 (ESA 1997 118 rows) A(ICRS) deg 00091185 00379737 -1 00500795 3	DE(ICRS) deg av 1.08901332 19.49883745 88.85928608 51.89354612	Plx pml mas mas as a	RA pn 6.20	nDE -1.88 -0.93 -2.91 0.16	e Plx B	Tmag mag 9.643 0.519 6.576 8.471	e VTmag mag mag over 0.020 9.130 (0.033 9.378 (0.004 6.621 (0.007 8.092 (0.007 8.007 8.092 (0.007 8.007 8.092 (0.007 8.007 8.092 (0.007 8.007	e B mag m 20.019 0. 0.021 0. 0.005 -0. 0.007 0.	Hpmag mag 482 9.2043 999 9.4017 019 6.6081 370 8.1498	e mag av 3 0.0020 7 0.0017 1 0.0007 8 0.0011	n of	Fa
Comparison Com	Luminosit -value : Real -error : Real -description -type : Luminosit -description -type : Lum	The Hipparcos The Hipparcos The Hipparcos The O0 00 00.22 2 00 00 00.91 3 00 00 02.01 5 00 00 02.39	DEdms +01 05 20.4 -19 29 55.8 +38 51 33.4 -51 53 36.8 -40 35 28.4	Catalogues (1182 Vmag Ramag 4 9.10 0.0 8 9.27 0.0 4 6.61 0.0 8 8.06 0.0 4 8.55 0.0	(ESA 1997 il8 rows) A(ICRS) deg 20091185 00379737 -1 00500795 3 00838170 -5	DE(ICRS) deg av 1.08901332 19.49883745 88.85928608 51.89354612 40.59122440	Plx pml mas mas and 3.54 -5 21.90 181 2.81 5 7.75 62 2.87 2	RA pn 5.20	nDE at/yr -1.88 -0.93 -2.91 0.16 9.07	e Plx B mat 1.39 3.10 1 0.63 0.97 1.11	Tmag mag 9.643 0.519 6.576 8.471	e VTmag mag mag over 0.020 9.130 (0.033 9.378 (0.004 6.621 (0.007 8.092 (0.007 8.007 8.092 (0.007 8.007 8.092 (0.007 8.007 8.092 (0.007 8.007	e B mag m 0.019 0. 0.021 0. 0.005 0. 0.007 0. 0.0010 0.	Hpmag mag 482 9.2043 999 9.4017 019 6.6081 370 8.1498 902 8.7077	8 emag 3 0.0020 7 0.0017 1 0.0007 8 0.0011 7 0.0018	n of	a
Compared to the compared to	Luminosit -value : Real -error : Real -description -type : Luminosit -description -type : Lum	The Hipparcos The Hipparcos The Hipparcos The O0 00 00.22 2 00 00 00.91 3 00 00 02.01 5 00 00 02.39 6 00 00 04.35	DEdms +01 05 20.4 -19 29 55.8 +38 51 33.4 -51 53 36.8 -40 35 28.4 +03 56 47.4	Catalogues (1182 Vmag Ramag 4 9.10 0.0 8 9.27 0.0 4 6.61 0.0 8 8.06 0.0 4 8.55 0.0 4 12.31 0.0	PhotometryFildml-id = "Photo (ESA 1997 128 rows) A(ICRS) deg 00091185 00379737 -1 00500795 3 00838170 -5 00996534 -4 01814144	DE(ICRS) deg av 1.08901332 19.49883745 88.85928608 51.89354612 40.59122440 3.94648893	Pix pml mas mas as a	RA pn 5.20 5.24 5.24 5.25 5.29 -1	nDE at/yr -1.88 -0.93 -2.91 0.16 9.07 12.84	e Plx B mat 1.39 3.10 1 0.63 0.97 1.11 4.99	Tmag mag 9.643 0.519 6.576 8.471 9.693	e VTmag mag mag 0.020 9.130 (0.033 9.378 (0.004 6.621 (0.007 8.092 (0.014 8.656 (0.007 8.092 (0.014 8.656 (0.007 8.092 (0.014 8.656 (0.007 8.092 (0.014 8.656 (0.007 8.092 (0.014 8.656 (0.007 8.092 (0.014 8.656 (0.007 8.092 (0.014 8.656 (0.007 8.092 (0.014 8.656 (0.007 8.092 (0.014 8.656 (0.007 8.092 (0.014 8.656 (0.007 8.092 (0.014 8.656 (0.007 8.092 (0.014 8.656 (0.007 8.092 (0.014 8.656 (0.007 8.092 (0.014 8.656 (0.007 8.092 (0.014 8.656 (0.007 8.092 (0.014 8.656 (0.007 8.092 (0.007 8.007	e B mag m 0.019 0. 0.021 0. 0.005 -0. 0.007 0. 0.010 0.	Hpmag mag 482 9.2043 999 9.4017 019 6.6081 370 8.1498 902 8.7077 336 12.4488	emag 30.0020 70.0017 10.0007 80.0011 70.0018 80.0085	n of	a
Comparison Com	DEJ2000 H "d:m::s" -01 05 20.43 -19 29 55.82 -38 51 33.40 -51 53 36.76 -40 35 28.33 -03 56 47.25 -20 02 10.01	The Hipparcos The Hipparcos The Hipparcos The Hipparcos The O 00 00.22 2 00 00 00.91 3 00 00 02.01 5 00 00 02.39 6 00 00 04.35 7 00 00 05.41	DEdms +01 05 20.4 -19 29 55.8 +38 51 33.4 -51 53 36.8 -40 35 28.4 +03 56 47.4 +20 02 11.8	Catalogues (1182 Vmag Ramag 4 9.10 0.0 8 9.27 0.0 4 6.61 0.0 8 8.06 0.0 4 8.55 0.0 4 12.31 0.0 8 9.64 0.0	PhotometryFildml-id = "Photo (ESA 1997 il8 rows) A(ICRS) deg 00091185 00379737 -1 00500795 3 00838170 -5 00996534 -4 01814144 02254891 2	DE(ICRS) deg av 1.08901332 19.49883745 88.85928608 51.89354612 40.59122440 3.94648893 20.03660216	Plx pml mas mas as a	RA pn 5.20 5.24 5.24 5.25 5.29 -1 5.12 -20	nDE 14 ALTY 1-1.88 -0.93 -2.91 0.16 9.07 12.84 000.79	e Plx B mat .xv 1.39 3.10 1 0.63 0.97 1.11 4.99 1.30 1	Tmag mag 9.643 0.519 6.576 8.471 9.693 0.542	e VTmag mag mag over 0.020 9.130 (0.033 9.378 (0.004 6.621 (0.007 8.092 (0.007 8.007 8.092 (0.007 8.007 8.092 (0.007 8.007 8.092 (0.007 8.007	e B mag m 0.019 0. 0.021 0. 0.005 -0. 0.007 0. 0.010 0. 1. 0.030 0.	Hpmag mag 482 9.2043 999 9.4017 019 6.6081 370 8.1498 902 8.7077 336 12.4488 740 9.6795	8 0.0020 7 0.0017 1 0.0007 8 0.0011 7 0.0018 8 0.0085 5 0.0021	n of	а
Comparison Com	Luminosity -value : Real -error : Real -description -type : Luminosity -type : Luminosity -description -descrip	The Hipparcos The Hipparcos The Hipparcos The Hipparcos The O 00 00.22 2 00 00 00.91 3 00 00 02.01 5 00 00 02.39 6 00 00 04.35 7 00 00 05.41 8 00 00 06.55 9 00 00 08.48	DEdms +01 05 20.4 -19 29 55.8 +38 51 33.4 -51 53 36.8 -40 35 28.4 +03 56 47.4 +20 02 11.1 +25 53 11.3 +36 35 09.4	Catalogues (1182 Vmag Ramag 4 9.10 0.0 8 9.27 0.0 4 6.61 0.0 8 8.06 0.0 4 12.31 0.0 8 9.64 0.0 3 9.05 0.0 4 8.59 0.0	PhotometryFildml-id = "Photo (ESA 1997 128 rows) A(ICRS) deg 00091185 00379737 -1 00500795 3 00838170 -5 00996534 -4 01814144 02254891 2 02729160 2 03534189 3	DE(ICRS) deg av 1.08901332 19.49883745 88.85928608 51.89354612 40.59122440 3.94648893 20.03660216 25.88647445 66.58593777	Plx pml mas mas are as a second secon	RA pn 5.20 5.24 5.24 5.25 5.29 5.12 5.30 5.00 5.00 5.00 5.00 5.00 5.00 5.00 .	nDE 1 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2	e Plx B mat	Tmag mag 9.643 0.519 6.576 8.471 9.693 0.542 0.433 9.962	e VTmag mag mag over 0.020 9.130 (0.033 9.378 (0.004 6.621 (0.007 8.092 (0.014 8.656 (0.039 9.679 (0.055 9.151 (0.025 8.71	e B mag m 0.019 0. 0.021 0. 0.005 -0. 0.007 0. 0.010 0. 1. 0.030 0. 0.029 1. 0.015 1.	Hpmag mag 482 9.2043 999 9.4017 019 6.6081 370 8.1498 902 8.7077 336 12.4488 740 9.6795 102 8.5522 067 8.7534	8 0.0020 7 0.0017 1 0.0007 8 0.0011 7 0.0018 8 0.0085 5 0.0021 2 0.1671 4 0.0018	n of	a
Tannotation(2 - 1 annotation(2 - 1 annot	DEJ2000 H "d:m:s" -01 05 20.43 -19 29 55.82 -38 51 33.40 -51 53 36.76 -40 35 28.33 -03 56 47.25 -20 02 10.01 -25 53 11.26 -36 35 09.45 -50 52 01.11	The Hipparcos The Hipparcos The Hipparcos The Hipparcos The O 00 00.22 2 00 00 00.91 3 00 00 02.01 5 00 00 02.39 6 00 00 04.35 7 00 00 05.41 8 00 00 06.55 9 00 00 08.48 10 00 00 08.70	DEdms +01 05 20.4 -19 29 55.8 +38 51 33.4 -51 53 36.8 -40 35 28.4 +03 56 47.4 +20 02 11.8 +25 53 11.3 +36 35 09.4 -50 52 01.5	Catalogues (1182 Vmag Ramag 4 9.10 0.0 8 9.27 0.0 4 6.61 0.0 8 8.06 0.0 4 12.31 0.0 8 9.64 0.0 3 9.05 0.0 4 8.59 0.0 6 8.59 0.0	PhotometryFildml-id = "Photo (ESA 1997 128 rows) A(ICRS) deg 00091185 00379737 -1 00500795 3 00838170 -5 00996534 -4 01814144 02254891 2 02729160 2 03534189 3 03625309 -5	DE(ICRS) deg av 1.08901332 19.49883745 88.85928608 51.89354612 40.59122440 3.94648893 20.03660216 25.88647445 66.58593777 50.86707360	Plx pml mas mas are as a second secon	RA pn 5.20 .21 .24 .85 .253 .29 -1 3.12 -20 .30 .23 4	nDE attr -1.88 -0.93 -2.91 0.16 9.07 12.84 40.0.79 -5.66 8.42 40.0.2	e Pix B mat	Tmag mag 9.643 0.519 6.576 8.471 9.693 0.542 0.433 9.962 9.9140	e VTmag mag mag mag over one of the ordinal of the	e B mag m 0.019 0. 0.021 0. 0.005 -0. 0.007 0. 0.000 0. 0.0030 0. 0.030 0. 0.029 1. 0.015 1. 0.010 0.	Hpmag mag 482 9.2043 999 9.4017 019 6.6081 370 8.1498 902 8.7077 336 12.4488 740 9.6793 102 8.5522 067 8.7534 489 8.6994	8 0.0020 7 0.0017 1 0.0007 8 0.0011 7 0.0018 8 0.0085 5 0.0021 2 0.1671 4 0.0018 4 0.0020	n of	fa
Comparison Com	DEJ2000 H "d:m::s" -01 05 20.43 -19 29 55.82 -38 51 33.40 -51 53 36.76 -40 35 28.33 -03 56 47.25 -20 02 10.01 -25 53 11.26 -36 35 09.45 -50 52 01.11 -46 56 23.99	The Hipparcos The Hipparcos The Hipparcos The Hipparcos The O 00 00.22 2 00 00 00.91 3 00 00 02.01 5 00 00 02.39 6 00 00 04.35 7 00 00 05.41 8 00 00 06.55 9 00 00 08.48	DEdms +01 05 20.4 -19 29 55.8 +38 51 33.4 -51 53 36.8 -40 35 28.4 +03 56 47.4 +20 02 11.8 +25 53 11.3 +36 35 09.4 -50 52 01.5 +46 56 24.6	Catalogues (1182 Vmag Ramag 4 9.10 0.0 8 9.27 0.0 4 6.61 0.0 8 8.06 0.0 4 12.31 0.0 8 9.64 0.0 3 9.05 0.0 4 8.59 0.0 5 8.59 0.0 0 7.34 0.0	PhotometryFildml-id = "Photo (ESA 1997 128 rows) A(ICRS) deg 00091185 00379737 -1 00500795 3 00838170 -5 00996534 -4 01814144 02254891 2 02729160 2 03534189 3 03625309 -5 03729695 4	DE(ICRS) deg av 1.08901332 19.49883745 88.85928608 51.89354612 40.59122440 3.94648893 20.03660216 25.88647445 66.58593777 50.86707360	Plx pml mas mas are as a second secon	RA pn 5.20 5.24 5.25 5.29 5.12 5.30 5.29 5.30 5.29 5.30 5.29 5.30 5.00 5.00 5.00 5.00 5.00 5.00 5.00 .	nDE at/yr -1.88 -0.93 -2.91 0.16 9.07 12.84 40.02 -2.02	e Plx B mat	Tmag mag 9.643 0.519 6.576 8.471 9.693 0.542 0.433 9.962 9.140 7.446	e VTmag mag mag over 0.020 9.130 (0.033 9.378 (0.004 6.621 (0.007 8.092 (0.014 8.656 (0.039 9.679 (0.055 9.151 (0.025 8.71	e B mag m 0.019 0. 0.021 0. 0.005 0. 0.007 0. 0.000 0. 0.0030 0. 0.0030 0. 0.0029 1. 0.015 1. 0.010 0. 0.005 0.	Hpmag mag 482 9.2043 999 9.4017 019 6.6081 370 8.1498 902 8.7077 336 12.4488 740 9.6795 102 8.5522 067 8.7534 489 8.6994 081 7.3777	8 0.0020 7 0.0017 1 0.0007 8 0.0011 7 0.0018 8 0.0085 5 0.0021 2 0.1671 4 0.0018 4 0.0020 7 0.0010	n of	a

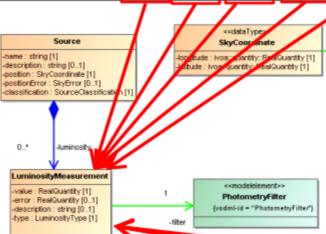
objid	fa	dec	u	g	ſ	i	z	run	rerun	camcol	field	specobjid	class	redshift	plate	mjd
1237680191504712292	319.42017295	-2.91605515	19.453272	17.512213	16.457823	5.911284	15.466995	8083	301	5	45	4933710530549838848	GALAXY	0.091911	4382	55742
1237680191504842797	319.6726666	-2.89320328	8.006258	18.408295	17.027491	6.594183	15.47355	8083	301	5	47	4933700634945188864	STAR	-9.116632E-5	4382	5574
1237660241388240997	51.95792979	0.44178806	17.90674	16.767498	16.243202	6.038309	15.933592	3438	301	5	146	2329593891403098112	STAR	-2.435169E-4	2069	5337
1237660241388371981	52.15864799	0.5100779	8.619341	17.314531	16.763399	16.53455	16.394312	3438	301	5	148	2329602687496120320	STAR	-1.707261E-5	2069	5337
1237660241925505040	52.72667419	0.88746662	7.930399	16.900446	16.418163	6.214106	16.1061	3438	301	6	152	2329600488472864768	STAR	-1.622409E-4	2069	5337
1237660241925505156	52.85661769	0.97756273	8.178764	16.997499	16.512629	6.314194	16.207306	3438	301	6	152	2329599663839143936	STAR	-1.234436E-4	2069	5337
1237662305111507089	202.55299093	39.86892911	17.820675	16.164869	15.296254	4.812856	14.419583	3919	301	1	16	5299625250001449984	GALAXY	0.048569	4707	5565
1237663238739787997	52.05059022	0.14966321	9.351822	18.277271	18.06134	7.999191	17.999123	4136	301	4	165	2329595265792632832	STAR	-5.184785E-4	2069	5337
1237651271358808122	158.78373508	63.9613952	9.283352	17.41073	16.419657	6.042131	15.731997	1350	301	1	295	550602195343534080	GALAXY	0.11802	489	5193
1237651271358808125	158.82992158	63.94061555	19.297565	17.409573	16.431635	6.044048	15.707916	1350	301	1	295	550601370709813248	GALAXY	0.117888	489	5193
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					7			SkyC	oordina	teFrame	1					

-frame

name : string [1]

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Identifying magnitude+error columns with (elements in) the collection of LuminosityMeasurement-s of a Source. (need instance of PhotometryFilter!)

I/239/hip main		The Hipparcos and Tycho Catalogues (ESA 1997)
1 annotation(s) -	post	The Hipparcos Main Catalogue (118218 rows)

Ful	RAJ2000	DEJ2000	HIP	RAhms	DEdms	Vmag	RA(ICRS)	DE(ICRS)	Plx	pmRA	pmDE	e Plx	BTmag	e	Tmag	e	B-V 1	Ipmag	е
	"h:m:s"	"d:m:s"				mag	deg	deg	mas	mas/yr	mas/yr	mas	mag	mag	mag	mag	mag	mag	mag
AT	AT	∆Ψ.	AT	AT	ΔΨ	AT	AT	AT	AT	AT	AT	AF	AT	AW	AF	AT	AT	∆.Ψ	AT
1	00 00 00.216	+01 05 20.43	1	00 00 00.22	+01 05 20.4	9.10	0.00091185	1.08901332	3.54	-5.20	-1.88	1.39	9.643	0.020	9.130	0.019	0.482	9.2043	0.002
- 2	00 00 01.024	-19 29 55.82	2	00 00 00.91	-19 29 55.8	9.27	0.00379737	-19.49883745	21.90	181.21	-0.93	3.10	10.519	0.033	9.378	0.021	0.999	9.4017	0.0017
3	00 00 01.206	+38 51 33.40	3	00 00 01.20	+38 51 33.4	6.61	0.00500795	38.85928608	2.81	5.24	-2.91	0.63	6.576	0.004	6.621	0.005	0.019	6.6081	0.0007
4	00 00 02.071	-51 53 36.76	4	00 00 02.01	-51 53 36.8	8.06	0.00838170	-51.89354612	7.75	62.85	0.16	0.97	8.471	0.007	8.092	0.007	0.370	8.1498	0.0011
5	00 00 02.394	-40 35 28.33	5	00 00 02.39	-40 35 28.4	8.55	0.00996534	-40.59122440	2.87	2.53	9.07	1.11	9.693	0.014	8.656	0.010	0.902	8.7077	0.0018
0	00 00 04.486	+03 56 47.25	6	00 00 04.35	+03 56 47.4	12.31	0.01814144	3.94648893	18.80	226.29	-12.84	4.99					1.336	2.4488	0.0085
2	00 00 05.283	+20 02 10.01	7	00 00 05.41	+20 02 11.8	9.64	0.02254891	20.03660216	17.74	-208.12	-200.79	1.30	10.542	0.039	9.679	0.030	0.740	9.6795	0.0021
8	00 00 06.562	+25 53 11.26	8	00 00 06.55	+25 53 11.3	9.05	0.02729160	25.88647445	5.17	19.09	-5.66	1.95	10.433	0.055	9.151	0.029	1.102	8.5522	0.1671
5	00 00 08.477	+36 35 09.45	9	00 00 08.48	+36 35 09.4	8.59	0.03534189	36.58593777	4.81	-6.30	8.42	0.99	9.962	0.025	8.711	0.015	1.067	8.7534	0.0018
10	00 00 08.740	-50 52 01.11	10	00 00 08.70	-50 52 01.5	8.59	0.03625309	-50.86707360	10.76	42.23	40.02	1.10	9.140	0.011	8.630	0.010	0.489	8.6994	0.0020
11	00 00 08.961	+46 56 23.99	11	00 00 08.95	+46 56 24.0	7.34	0.03729695	46.94000154	4.29	11.09	-2.02	0.84	7.446	0.005	7.364	0.005	0.081	7.3777	0.0010
12	00 00 09.816	-35 57 36.81	12	00 00 09.82	-35 57 36.8	8.43	0.04091756	-35.96022482	4.06	-5.99	-0.10	1.16	10.369	0.023	8.588	0.010	1.484	8.5598	0.0012
13	00 00 10.008	-22 35 40.94	13	00 00 10.00	-22 35 40.9	8.80	0.04167970	-22.59468060	3.49	8.45	-10.07	1.48	10 216	0.026	8 887	0.014	1.128	8 9707	0.0017

More on mapping tomorrow