Visuals

The voice of your paper

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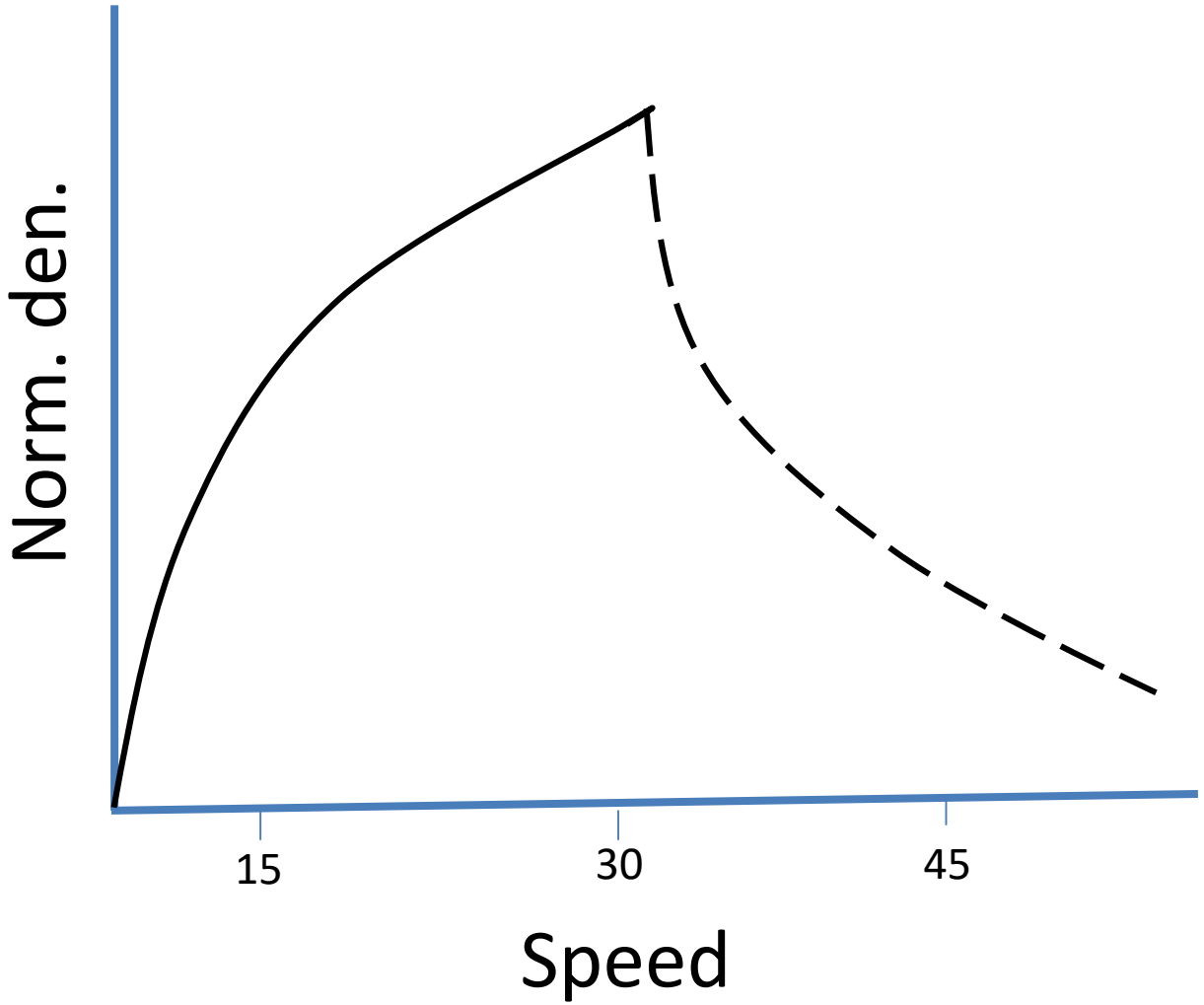
Chapter 15 of Lebrun (2007)

- A voice attracts attention. Likewise, photos and graphics shout their messages.
- Visuals have a loud and convincing voice, but only if you can make them speak. The language is based on a special grammar that describes the correct use of fonts, blocking, typesetting, framing, white space, line (space), and colors, etc.
- Figures form the plot (story) of the paper so should be made first before starting to write the paper.
- It is often straightforward to generate figures out of data. But what story do you intend to tell?


Norm. den.
15
30
45
Speed

Seven Principles for Good Visuals

1. A visual does not ask more questions than it can answer.

   Mind the axis labeling and legends. Too many details are distracting.

2. A visual is custom-designed to support the contribution of only one paper.

   Redraw a figure if needed.

3. A visual keeps its complexity in step with readers' understanding.

   A compelling visual should compare "before" versus "after", or "with" versus "without".

   More complex visuals are placed closer to the end of the paper.

   Avoid using small font types, so resizing does not affect readability.

4. A visual is designed based on its contribution, not on its ease of creation.

   Does this visual replace much text or strongly support your contribution?

   More visuals → your contribution is diluted.

5. A visual has its elements arranged to make its purpose immediately apparent.

   A visual may be impressive, but the readers are not impressed.

   Like the first text version of the paper, the first visual is rarely the best.

6. A visual is concise if its clarity declines when a new element is added or removed.

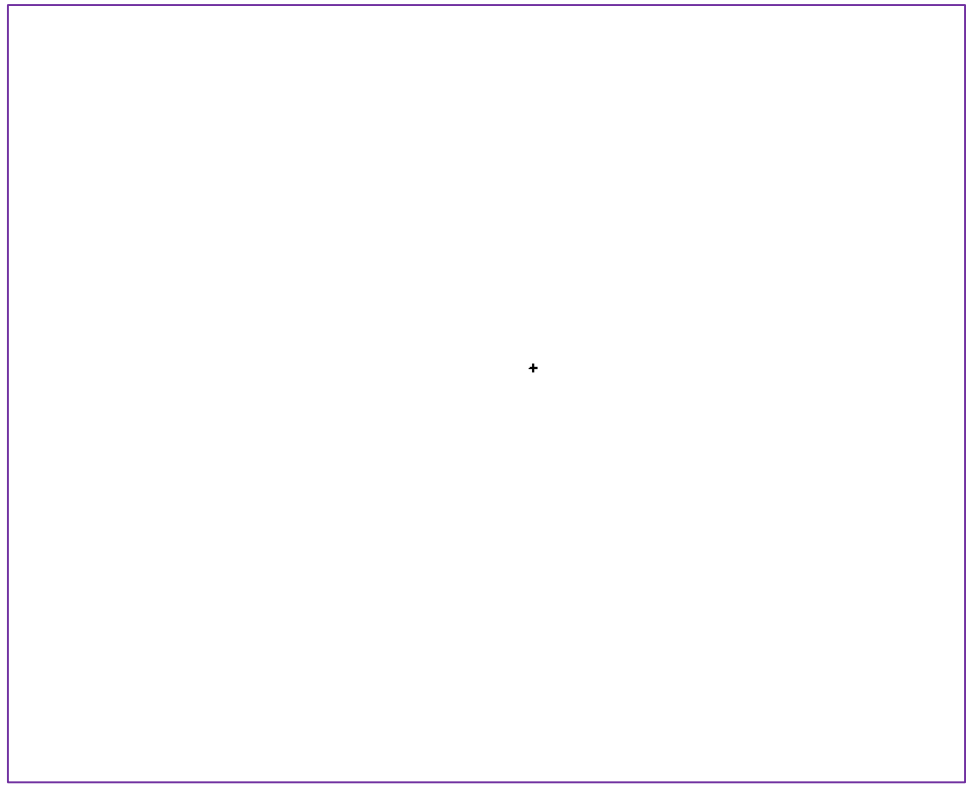
   Be aware of the "everything but the kitchen sink" visual.

7. Beside the caption, a visual requires no external text support to be understood.

   See text?

- Choose the key figure in your paper and show it to your colleagues. Do not show the caption.
- Ask them to hypothesize what you want to show. Do they have questions?
- Then show them the caption. Are their questions answered?

名稱	修改日期	類型	大小
adot.eps	2021/6/3 下午 04:41	ACDSee Ultimate 2...	2,477 KB
adot.png	2021/6/3 下午 04:42	ACDSee Ultimate 2...	4 KB



B. AUTHOR PUBLICATION CHARGES

Finally some information about the AAS Journal's publication charges. In April 2011 the traditional way of calculating author charges based on the number of printed pages was changed. The reason for the change was due to a recognition of the growing number of article items that could not be represented in print. Now author charges are determined by a number of digital "quanta". A single quantum is 350 words, one figure, one table, and one enhanced digital item. For the latter this includes machine readable tables, figure sets, animations, and interactive figures. The current cost for the different quanta types is available at https://journals.aas.org/article-charges-and-copyright/#author_publication_charges. Authors may use the ApJL length calculator to get a `rough` estimate of the number of word and float quanta in their manuscript. The calculator is located at https://authortools.aas.org/ApJL/betacountwords.html.

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Author: Chia-Lung Lin

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C. ROTATING TABLES

The process of rotating tables into landscape mode is slightly different in AASTEXv6.31. Instead of the `\rotate` command, a new environment has been created to handle this task. To place a single page table in a landscape mode start the table portion with `\begin{rotatetable}` and end with `\end{rotatetable}`.

Tables that exceed a print page take a slightly different environment since both rotation and long table printing are required. In these cases start with `\begin{longrotatetable}` and end with `\end{longrotatetable}`. Table 1 is an example of a multi-page, rotated table. The `\movetabledown` command can be used to help center extremely wide, landscape tables. The command `\movetabledown=1in` will move any rotated table down 1 inch.

Table 1. Gaia eDR3 data of Omega Centauri in 10 arcmin

RA	e_RA	Dec	e_Dec	Plx	e_Plx	pmRA	e_pmRA	pmDec	e_pmDec	G	e_G	BP	e_BP	RP	e_RP
(deg)	(deg)	(deg)	(deg)	(mas)	(mas)	(mas/yr)	(mas/yr)	(mas/yr)	(mas/yr)	(mag)	(mag)	(mag)	(mag)	(mag)	(mag)
201.698	0.1468	-47.480	0.1008	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	15.012	0.0053	14.518	0.0670	13.533	0.0106
201.697	0.8692	-47.478	0.9152	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	16.927	0.0216	15.612	0.0503	14.574	0.0108
201.698	1.1247	-47.480	0.8367	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	15.635	0.0071	14.444	0.0116	13.503	0.0945
201.695	0.4191	-47.479	0.4017	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	15.448	0.0088	14.861	0.0323	13.823	0.0227
201.695	4.3293	-47.478	6.8841	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	17.264	0.0418	14.983	0.0296	14.054	0.0119
201.695	1.0131	-47.479	0.3895	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	16.780	0.0191	14.968	0.0575	13.822	0.0286
201.695	0.2131	-47.478	0.2329	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	16.266	0.0093	14.888	0.0507	13.866	0.0421
201.694	0.0509	-47.480	0.0356	0.1469	0.0681	-3.9840	0.0570	-6.7970	0.0620	13.059	0.0031	13.472	0.0037	12.244	0.0041
201.700	0.5661	-47.480	0.5207	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	15.750	0.0081	14.637	0.0640	13.661	0.0043
201.699	0.0493	-47.481	0.0746	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	12.792	0.0030	13.244	0.0068	11.918	0.0054
201.700	0.3249	-47.479	0.2190	-0.3488	0.4735	-3.5700	0.2620	-8.1770	0.4160	16.088	0.0082	15.006	0.0576	14.032	0.0185
201.694	0.3352	-47.478	0.1524	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	16.236	0.0316	15.109	0.3056	14.135	0.0207
201.694	0.1208	-47.479	0.3232	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	15.577	0.0164	14.803	0.0449	13.902	0.0414
201.700	4.2596	-47.481	15.7474	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	16.212	0.0252	100.000	99.9999	100.000	99.9999
201.700	1.9891	-47.481	6.5363	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	15.555	0.0082	14.788	0.1304	13.728	0.1173

NOTE—First 15 rows of stellar properties toward Omega Centauri within 10 arcmin radius from Gaia eDR3. Empty spaces are filled in with 99.9999.

Table 1. Gaia eDR3 data of Omega Centauri in 10 arcmin

RA (deg)	e_RA (deg)	Dec (deg)	e_Dec (deg)	Plx (mas)	e_Plx (mas)	pmRA (mas/yr)	e_pmRA (mas/yr)	pmDec (mas/yr)	e_pmDec (mas/yr)	G (mag)	e_G (mag)	BP (mag)	e_BP (mag)	RP (mag)	e_RP (mag)
201.698	0.1468	−47.480	0.1008			...	...	99.9999	99.9999	15.012	0.0053	14.518	0.0670	13.533	0.0106
201.697	0.8692	−47.478	0.9152	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	16.927	0.0216	15.612	0.0503	14.574	0.0108
201.698	1.1247	−47.480	0.8367	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	15.635	0.0071	14.444	0.0116	13.503	0.0945
201.695	0.4191	−47.479	0.4017	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	15.448	0.0088	14.861	0.0323	13.823	0.0227
201.695	4.3293	−47.478	6.8841	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	17.264	0.0418	14.983	0.0296	14.054	0.0119
201.695	1.0131	−47.479	0.3895	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	16.780	0.0191	14.968	0.0575	13.822	0.0286
201.695	0.2131	−47.478	0.2329	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	16.266	0.0093	14.888	0.0507	13.866	0.0421
201.694	0.0509	−47.480	0.0356	0.1469	0.0681	-3.9840	0.0570	-6.7970	0.0620	13.059	0.0031	13.472	0.0037	12.244	0.0041
201.700	0.5661	−47.480	0.5207	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	15.750	0.0081	14.637	0.0640	13.661	0.0043
201.699	0.0493	−47.481	0.0746	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	12.792	0.0030	13.244	0.0068	11.918	0.0054
201.700	0.3249	−47.479	0.2190	-0.3488	0.4735	-3.5700	0.2620	-8.1770	0.4160	16.088	0.0082	15.006	0.0576	14.032	0.0185
201.694	0.3352	−47.478	0.1524	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	16.236	0.0316	15.109	0.3056	14.135	0.0207
201.694	0.1208	−47.479	0.3232	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	15.577	0.0164	14.803	0.0449	13.902	0.0414
201.700	4.2596	−47.481	15.7474	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	16.212	0.0252	100.000	99.9999	100.000	99.9999
201.700	1.9891	−47.481	6.5363	99.9999	99.9999	99.9999	99.9999	99.9999	99.9999	15.555	0.0082	14.788	0.1304	13.728	0.1173

NOTE—First 15 rows of stellar properties toward Omega Centauri within 10 arcmin radius from Gaia eDR3. Empty spaces are filled in with 99.9999.

Table 4
Parameters of the VVV Variables Considered in This Work

0ID	α(2000)	δ(2000)	l	b	Mean K_S	$K_S$err	Nobs [8.0]	Ampl	η [24]	TileID	K_S55264	mag_err4	J	Jerr	H	Herr	$J-H$	$H-K_S$	Class Class	Var Class	Comment	Reference
[3.6]	[3.6]err	[4.5]	[4.5]err	[5.8]	[5.8]err	[8.0]	err	[24]	err	W1	W1err	W2	W2err	W3	W3err	W4	W4err	α	(α)			
d045_v1	194.045408	−63.311269	303.4645635	−0.4444275	16.422	0.032	42	1.444	0.414	d045										LAE		
14.051	0.099	13.213	0.095	12.326	0.143	11.541	0.063	7.87	0.1									0.459	Class I			
d045_v2	194.082928	−63.608539	303.4757633	−0.7419591	12.348	0.017	51	0.742	0.157	d045	11.889	0.058	13.659	0.121	12.616	0.098	1.043	0.727	T	Dipper		
11.176	0.075	10.888	0.073	10.551	0.089	10.378	0.074	5.51	0.07	10.766	0.03	10.49	0.027	8.738	0.184	4.854	0.104	0.176	Flat			
d045_v3	194.089278	−63.331243	303.4838829	−0.4647675	16.027	0.022	52	1.08	0.285	d045	15.663	0.059			17.522	0.067		1.859		Fader	in-group	
12.548	0.075	11.149	0.057	10.346	0.148																	
d045_v4	194.101456	−63.39115	303.4881923	−0.5247683	13.912	0.014	45	0.686	0.553	d045	13.807	0.058			17.063	0.066		3.256		LAE		Robitaille
9.91	0.038	8.612	0.038	7.376	0.024	6.773	0.022			10.161	0.023	8.255	0.019	5.98	0.025	3.652	0.024	−0.043	Flat			
d045_v5	194.242266	−63.77788	303.542943	−0.9126947	14.142	0.019	50	1.038	0.319	d045	13.576	0.058	15.01	0.12	14.154	0.098	0.856	0.578	T	Fader		
13.226	0.079	12.787	0.071	12.723	0.249	12.315	0.121											−1.326	Class II			
d045_v6	194.406342	−63.158305	303.6303178	−0.2949481	12.858	0.023	51	1.049	0.458	d045	12.432	0.057	14.098	0.12	13.134	0.098	0.964	0.702	T	Eruptive	FIRE	
12.9	0.036	12.707	0.061	12.274	0.104	12.225	0.203			11.75	0.031	11.379	0.027	9.723	0.061	8.084		−0.239	Flat			
d045_v7	194.475246	−63.443083	303.654274	−0.5804006	14.287	0.015	53	0.8	0.447	d045	14.044	0.058	15.276	0.12	14.57	0.098	0.706	0.526	T	Dipper		
13.293	0.064	12.937	0.121	12.996	0.329	12.562	0.301											−1.621	Class III			
d045_v8	194.502338	−63.006601	303.6775207	−0.1443672	13.714	0.026	46	1.265	0.609	d045	13.252	0.057	15.783	0.12	14.295	0.098	1.488	1.043	T	Eruptive		
11.906	0.042	11.203	0.034	10.564	0.044	9.666	0.022											0.854	Class I			
d045_v9	194.502973	−62.98427	303.6783789	−0.1220508	14.545	0.013	46	0.766	1.053	d045	14.204	0.057	15.593	0.12	14.643	0.098	0.95	0.439	F	STV		
13.457	0.046	12.9	0.065	12.349	0.107	11.514	0.05											0.366	Class I			
d045_v10	194.558735	−62.93687	303.7049504	−0.0753248	16.052	0.027	47	1.405	0.698	d045										STV		Robitaille
11.691	0.042	10.617	0.053	9.583	0.028	8.717	0.026			12.576	0.039	10.578	0.022	8.08	0.026	5.595	0.04	−0.007	Flat			
... And 186 more objects ...																						

Note. Description of each column and the full version of the table are available at the CDS.

(This table is available in its entirety in machine-readable form.)

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(This table is available in its entirety in machine-readable form.)

Table 1
Previous Distance Estimates[a]

Paper Name	Trumpler 14 D (kpc)	Trumpler 16 D (kpc)	Notes[b]
Thé & Vleeming (1971)	2.0 ± 0.2	2.5 ± 0.2	$R_V = 3.0$
Thé et al. (1980)	2.8 (2.3)	2.8 (2.4)	$R_V = 3.3$ (4.0)
Walborn (1973a)	3.5	2.6	UBV
Feinstein et al. (1973)	$2.65 \pm 10\%$	$2.65 \pm 10\%$	UBV ($R_V = 4.0$)
Humphreys (1978)	3.60 ± 0.15	2.69 ± 0.15	Blue/Red Supergiants
Turner & Moffat (1980)	2.70 ± 0.17	2.70 ± 0.17	UBV ($R_V = 3.20 \pm 0.28$)
Thé et al. (1980)	2.3 ± 0.3	2.4 ± 0.3	UBV ($R = 4$)
Levato & Malaroda (1981)	⋯	2.6	V (Col 228) ($R_V = 3.2$–4.0)
Walborn (1982b)	2.8	2.8	UBV ($R_V = 3.0$)
Tapia et al. (1988)	2.4 ± 0.2	2.4 ± 0.2	JHKL
Morrell et al. (1988)	2.8 (3.45)	⋯	V; R_V variable (3.2)
Massey & Johnson (1993)	$3.2 \pm 4\%$	$3.2 \pm 4\%$	UBV ($R_V = 3.2$)
Allen & Hillier (1993)	⋯	2.2 ± 0.2	η Car expansion
Walborn (1982b)	2.8	2.8	UBV ($R_V = 3.0$)
Vázquez et al. (1996)	$3.2 \pm 10\%$	⋯	UBVRI
Davidson & Humphreys (1997)	⋯	2.3 ± 0.2	η Car
Meaburn (1999)	⋯	2.3 ± 0.3	η Car expansion
Davidson et al. (2001)	⋯	2.25 ± 0.18	η Car expansion
DeGioia-Eastwood et al. (2001)	$3.6 \pm 5\%$	$3.61 \pm 5\%$	UBV
Tapia et al. (2003)	2.8 ± 0.2	2.5 ± 0.2	UBVRIJHK
Carraro et al. (2004)	2.5 ± 0.3	4.0 ± 0.5	UBVRI
Smith (2006a)	⋯	2.35 ± 0.05	η Car expansion
Hur et al. (2012)	2.9 ± 0.3	2.9 ± 0.3	UBVI
Davidson et al. (2018)	3.0 ± 0.2	2.6 ± 0.2	Gaia-DR2
Kuhn et al. (2019)	$2.64^{+0.31}_{-0.25}$	$2.61^{+0.31}_{-0.25}$	Gaia-DR2
Povich et al. (2019)	$2.50^{+0.28}_{-0.23}$	$2.50^{+0.28}_{-0.23}$	Gaia-DR2

Notes.
[a] Photometric distance estimates were estimated with various assumptions about the ratio of total-to-selective extinction, $R_V = A_V/E(B-V)$. These extinction corrections to V magnitudes provided distance moduli $\mathrm{DM} = V - M_V - A_V$, typically ranging from 11.8 to 13.0 and converted to physical distances by the relation $D_{\mathrm{phot}} = (10\ \mathrm{pc})10^{\mathrm{DM}/5}$.
[b] Notes on photometry methods and assumed values of R_V (between 3.0 and 4.2). In a review, Walborn (2012) estimated a Tr 16 distance of $(2.25\ \mathrm{kpc})(0.8)^{(R_V-4)}$.

Table 4
Gaia Proper Motions[a]

Star Name	PM $^{(Sun)}_{R.A.}$ (mas yr^{-1})	PM $^{(Sun)}_{decl.}$ (mas yr^{-1})	PM $^{(Car)}_{R.A.}$ (mas yr^{-1})	PM $^{(Car)}_{decl.}$ (mas yr^{-1})	PM $^{(Car)}_{tot}$ (mas yr^{-1})	V_{tran} (km s^{-1})
Trumpler 14:						
HD 93129A	-6.277 ± 0.019	2.801 ± 0.019	$+0.303$	$+0.616$	0.686 ± 0.082	7.64 ± 0.91
HD 93129B	-6.618 ± 0.020	2.182 ± 0.019	-0.038	-0.003	0.038 ± 0.063	0.42 ± 0.70
HD 93128	-6.616 ± 0.016	2.135 ± 0.016	-0.036	-0.050	0.062 ± 0.078	0.69 ± 0.87
HD 93160	-6.389 ± 0.034	3.011 ± 0.034	$+0.191$	$+0.826$	0.848 ± 0.090	9.45 ± 1.00
HD 93161A	-6.509 ± 0.029	2.109 ± 0.029	$+0.071$	-0.076	0.104 ± 0.079	1.16 ± 0.88
HD 93161B	-6.890 ± 0.029	1.862 ± 0.030	-0.310	-0.323	0.448 ± 0.079	4.99 ± 0.89

```
\title{A Practice of AASTEX 6.3.1 of tables and figures}

\section{Longrotate deluxtable}

\begin{longrotatetable}
\begin{deluxetable}{ccCccccccccccccc}
…
```

```
Figure~\ref{fig:cmd} presents the
Gaia/eDR3 $g$ versus $(BP-RP)$ color-
magnitude diagram within 10\arcmin\,
of Omega Cen.

\begin{figure}[htbp]
 \centering
 \includegraphics[angle=0,width=\columnwidth]
     {lee.png}
 \caption{Color-magnitude diagram of
      Gaia/Edr3 stars within 10\arcmin\, of
          Omega Centauri}
 \label{fig:cmd}
\end{figure}
```

Figure 1 presents the Gaia/eDR3 g versus $(BP - RP)$ color-magnitude diagram within 10′ of Omega Cen.

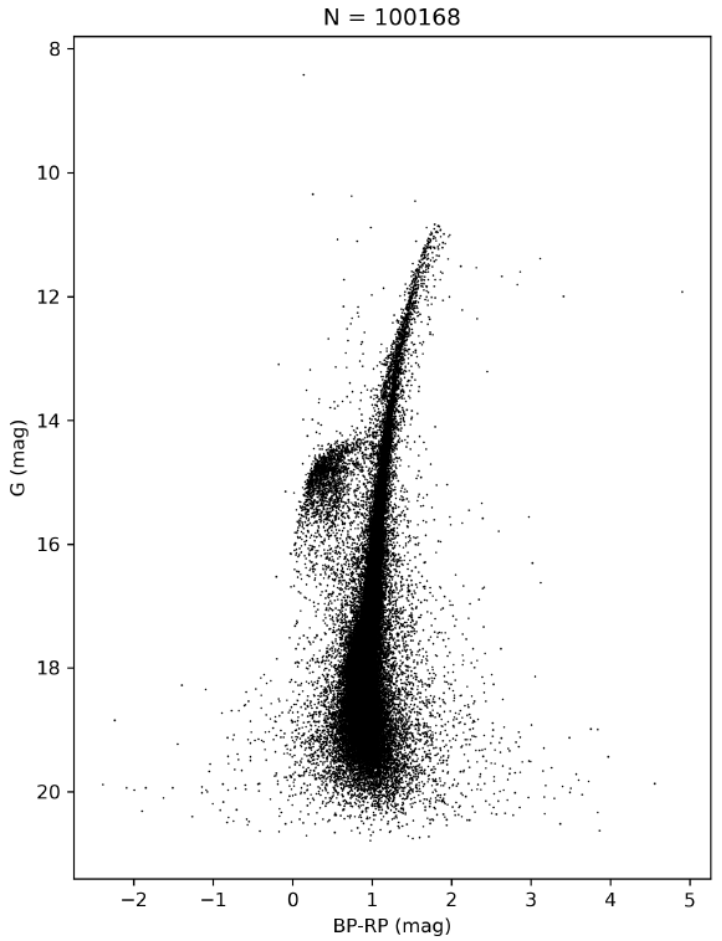

Figure 1. Color-magnitude diagram of Gaia/eDR3 stars within 10′ of Omega Centauri