LATEX TEMPLATE FOR APJ PAPERS

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ABSTRACT

This template shows some basic features of a LaTeX template for a manuscript in The Astrophysical Journal (ApJ) style. You can find the source code for this template in github.com/pcubillos/ApJtemplate. Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

Key words: methods: statistical – planetary systems – techniques: photometric

1. INTRODUCTION

This is an introductory section. Start with some broad background and, as you advance, give more specific details concerning your research. Usually, the last paragraph of the introduction details the content in the rest of the sections.

In Section 2, we describe observations, show some examples of how to cite other papers. In Section 3, we show how to compile this document, show a Figure example and give some quick grammar lessons. In Section 4, we present a physical interpretation of our data and show a Table example. Finally, in Section 5 we conclude.

2. OBSERVATIONS

We observed exoplanets, many of them. Sometimes we deal with theory, but most of the time we reduce data.

This text shows how to cite other people's papers. Harrington et al. (2006) is a citation to a paper. Citations can also be in parenthesis (e.g., Harrington et al. 2007). Multiple papers can be cited in one go (Stevenson et al. 2010, 2012a,b; Blecic et al. 2013, 2014; Cubillos et al. 2013, 2014; Campo et al. 2011; Nymeyer et al. 2011).

The references information is kept in bibtex format. Bibtex entries are generally obtained from ADS, and should be stored in a bibfile (see 'bibfile-template.bib').

3. COMPILING LATEX

To properly compile a latex document that uses bibtex (this one, for example) you need to run these set of commands from the prompt:

```
latex template
bibtex template
latex template
latex template
```

```
latex template
```

The multiple latex calls are necessary to let LaTeX properly set the cross references. However, you can compile the document with this single command:

```
latbibdo template
```

If you include the following functions into your bash file (∼/.bashrc for Unix, or ∼/.bash_profile for OSX)[1]:

```
latexcl(){ rm -f $*.bbl $*.blg $*.dvi $*.log $*.aux $*.ps $*.pdf; }
lblll(){ latex $* ; bibtex $* ; latex $* ; latex $* ; latex $*; }
pspdfembed(){ ps2pdf -dMaxSubsetPct=100 -dCompatibilityLevel=1.3 -dSubsetFonts=true -dEmbedAllFonts=true $*; }
latpdf(){ dvips -R0 -P pdf -t letter -f $* | pspdfembed - - > $*.pdf & }
latbibdo(){ latexcl $*; lblll $* ; latpdf $* & }
latexdo(){ latexcl $* ; latex $* ; latex $* ; latex $* ; latpdf $* & }
```

Alternatively, if you want to use pdflatex, put this set of functions in your bash:

```
latex () { pdflatex "$@" ; }
latexcl () { rm -f "$@".bbl "$@".blg "$@"Notes.bib "$@".out "$@".dvi "$@".log "$@".aux "$@".lof "$@".lot "$@".toc "$@".ps "$@".pdf; }
lblll () { latex "$@" ; bibtex "$@" ; latex "$@" ; latex "$@"; latex "$@"; }
latbibdo () { latexcl "$@"; lblll "$@" ; }
latexdo () { latexcl "$@" ; latex "$@" ; latex "$@" ; latex "$@" ; }
```

For the plain latex commands (the first option) you can include .ps or .eps figures (see Section 3.2). For pdflatex (the second option) you can include .pdf figures.

To delete all non-source files, run:

```
latexcl template
```

author@email.org

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[1] Take a look at the .tex source code to copy-paste these commands.
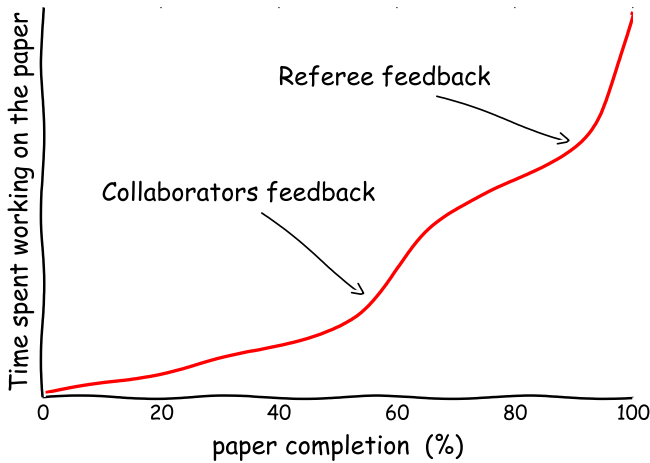
The Paper Publication Process

Figure 1. The Paper Publication Process. The following clause seems to be universal: "The closer you are to finish a paper, the longer it takes to make any significant improvement." On other news, although this figure in particular has a title, in papers, figure titles appear as the first sentence fragment of the caption, as seen in this caption, rather than at the top of the graphic.

To get a PDF file from a .tex document from a clean run, do:

```
latexdo template
```

latexdo will delete your non-source files (.pdf, .aux, etc.) and run latex several times to get all the page and section references right.

3.1. *Top File*

The `top-apj.tex` file contains the latex header. In there you can choose the document class between `aastex6.cls` (default), `emulateapj.cls`, or others (e.g., `article.cls`). You can also add additional packages, set the bibliography style, and add your favorite commands. Other than that, you do not need to mess much with the top file.

3.2. *Figures*

Figure 1 depicts the paper writing process. It is very useful to keep a record of the source plotting code into the .tex source file (see comment in the Fig caption), so you can easily find how you made the plot and make updates. Because you will have to re-make the plot. Yes, many times.

3.3. *Grammar*

And now some grammar: 'which' introduces a clause that adds a new fact, and must be set between commas. For example: "There was an earthquake in Chile, which isn't really any news." 'That' introduces a clause that explains or limits, and has no surrounding commas. For example: "Class O-stars that lie in the constellation of Orion have small proper motion."

Use the "Oxford" comma in lists. For example, "I love my parents, Lady Gaga, and Humpty Dumpty.", NOT "I love my parents, Lady Gaga and Humpty Dumpty."

Use a hyphen to connect two adjectives acting as a single adjective on a noun. You have a bad-pixel map, not a bad pixel map. The former is a map of bad pixels. The latter could be a pixel map, but a bad one. The hyphen breaks the ambiguity. However, do *not* use a hyphen between an adverb and an adjective, as the adverb could never modify the noun and there is no ambiguity: "We applied a poorly made mask," not, "we applied a poorly-made mask." Note that this is a change in practice from before 2000 or so. Also, do not hyphenate inside names or between a number and its units: "our 3 hour Markov-Chain Monte Carlo run," not "our 3-hour Markov-Chain Monte-Carlo run."

4. SCIENCE

This section gives a scientific interpretation of the analyzed data. The '\micro' macross provides the unslanted mu, 'μ' to be used for units of values, for example: μm or μbar. Another nice feature are '$\ttt{n}$' for a 'ten-to-the-n' (10^n) and '$\tttt{n}$' for 'times-ten-to-the-n' ($\times 10^n$).

Table 1 is a table. Tables are well behaved; most of the time they appear right (or close to) where you put them. Figures are not. The can show up anywhere in the pdf. Be patient.

Table 1. Light curve parameters

Parameter	Value
Eclipse depth (counts)	98.1
Eclipse duration (phase)	0.1119
Eclipse mid point (phase)	0.5015
Eclipse ingress/egress time (phase)	0.013
Ramp slope (counts/phase)	0.006
System flux (counts)	25815

Deluxe tables, like Table 2 are great. If they are too long, they automatically split and continue in the next page. Everything looks fine in Aastex6; however, in emulateapj the format seems to fail. Deluxe table may be a bit tricky. If you surround it with the table environment, you can specify where to place them (e.g., top, bottom). However, if you do, long tables wont automatically break into separate pages. So, there is a trade off.

4.1. *Non-ApJ Templates*

This template is also compatible with other class files (e.g., article). This can come in handy when preparing proposals. Especially for this case, take a look at the `top-apj.tex` file to enable the compact and or bullet-point Refenreces list.

5. CONCLUSIONS

Table 2. Planets

Name	Mass	Radius	T_{eq}	Ω	a	M_s	Age	Ω_{rot}	Flux	L_h	L_e	L_h/L_e	Ref. [a]
	$M_\oplus$	$R_\oplus$				$M_\odot$		$\Omega_\odot$	$\mathrm{erg\,s^{-1}\,cm^{-2}}$	$\mathrm{s^{-1}}$	$\mathrm{s^{-1}}$		
55 Cnc e	8.38±0.39	2.08±0.16	1957	15.6	0.015	0.91	10.2	1.4	142697.6	3×10^{30}	3×10^{30}	$\cdots$	De11
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55 Cnc e	8.38±0.39	2.08±0.16	1957	15.6	0.015	0.91	10.2	1.4	142697.6	$\cdots$	$\cdots$	$\cdots$	De11
55 Cnc e	8.38±0.39	2.08±0.16	1957	15.6	0.015	0.91	10.2	1.4	142697.6	$\cdots$	$\cdots$	$\cdots$	De11

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These are our conclusions. Although this example has used a colloquial dialogue, real papers should use a formal writing style. After the conclusions we include some acknowledgments.

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REFERENCES

Astropy Collaboration et al. 2013, A&A, 558, A33, ADS, 1307.6212

Blecic, J. et al. 2014, ApJ, 781, 116, ADS, 1302.7003

—. 2013, ApJ, 779, 5, ADS, 1111.2363

Campo, C. J. et al. 2011, ApJ, 727, 125, ADS, arXiv:1003.2763

Cubillos, P., Harrington, J., Madhusudhan, N., Foster, A. S. D., Lust, N. B., Hardy, R. A., & Bowman, M. O. 2014, ApJ, 797, 42, ADS, 1411.3093

Cubillos, P. et al. 2013, ApJ, 768, 42, ADS, 1303.5468

Harrington, J., Hansen, B. M., Luszcz, S. H., Seager, S., Deming, D., Menou, K., Cho, J. Y.-K., & Richardson, L. J. 2006, Science, 314, 623, ADS, arXiv:astro-ph/0610491

Harrington, J., Luszcz, S., Seager, S., Deming, D., & Richardson, L. J. 2007, Nature, 447, 691, ADS

Hunter, J. D. 2007, Computing In Science & Engineering, 9, 90

Jones, E., Oliphant, T., Peterson, P., et al. 2001, SciPy: Open source scientific tools for Python, [Online; accessed 2017-02-12]

Nymeyer, S. et al. 2011, ApJ, 742, 35, ADS, 1005.1017

Stevenson, K. B. et al. 2012a, ApJ, 754, 136, ADS, 1108.2057

—. 2012b, ApJ, 755, 9, ADS, 1207.4245

—. 2010, Nature, 464, 1161, ADS, arXiv:1010.4591

Team, A. J., & Hendrickson, A. 2016, AASJournals/AASTeX60: Version 6.1

van der Walt, S., Colbert, S. C., & Varoquaux, G. 2011, Computing in Science & Engineering, 13, 22

A. BAYESIAN CREDIBLE REGION

In the Bayesian context, given the posterior probability density, $p(\theta|\mathbf{D})$, of a parameter, θ, given the dataset, $\mathbf{D}$, the highest posterior density region (or credible region), R, is defined by

$$C = \int_R \mathrm{d}\theta \; p(\theta|\mathbf{D}) \tag{1}$$

where C is the probability contained in the credible region. The region R is selected such that the posterior probability of any point inside R is larger than that of any point outside. We like Eq. (1).