

# Do it *likeapj*: Alternative Open Source L<sup>A</sup>T<sub>E</sub>X Class and Bibliography files for Optimal AAS Journal Emulation

Panayiotis Tzanavaris<sup>1,2</sup><sup>1</sup>University of Maryland, Baltimore County, 1000 Hilltop Circle, Baltimore, MD 21250, USA<sup>2</sup>Laboratory for X-ray Astrophysics, NASA/Goddard Space Flight Center, Mail Code 662, Greenbelt, Maryland, 20771, USA*Received January 23, 2019; revised ; accepted ; published*

Submitted to ArXiv

## Abstract

We present and make publicly available new L<sup>A</sup>T<sub>E</sub>X class and bibliography styles that most closely emulate the current format of American Astronomical Society (AAS) journals. The two files `likeapj.cls` and `likeapj.bst` can help produce a pdf preprint that closely matches the final published version. We also provide a set of guidelines, following which, to our knowledge, a much more faithful formatting can be obtained than with other available files. Improvements range from correct fonts and case for Sections and Subsections, to running heads, to fully hyperlinked figures, tables, and references following current AAS style. The present document, as well as preprint <https://arxiv.org/abs/1901.06464> can be used as templates.

**Key words:** typesetting:L<sup>A</sup>T<sub>E</sub>X publications:AAS

## 1. Introduction

A considerable number of articles from the the current astronomy and astrophysics literature are published in journals of the American Astronomical Society (AAS). While the advent of Donald Knuth's T<sub>E</sub>X and Leslie Lamport's L<sup>A</sup>T<sub>E</sub>X gave authors wide control and responsibility for formatting their articles, initially there was no adequate template for producing preprints with the actual AAS look. That void was eventually filled by Maxim Markevitch's and Alexey Vikhlinin's highly popular *emulateapj* package, which first<sup>1</sup> appeared more than twenty years ago with the preprint for Markevitch (1997) (<https://arxiv.org/abs/astro-ph/9704106>) on ArXiv.

Distributed by AAS journals in 2016, AAST<sub>E</sub>X v6.0 and 6.1 are based on, and incorporate several features of, *emulateapj*. AAST<sub>E</sub>X v6.2 was distributed in 2018. In our experience, due to changes in the standard formatting of AAS articles, and unlike with earlier versions of *emulateapj*, the format obtained for preprints shows some key differences from the final published one. In particular, a forced white space after the abstract (now removed in AAST<sub>E</sub>X v6.2) motivated this author to start modifying the AAST<sub>E</sub>X v6.1 style file `aastex61.cls`. In addition, we modified the open source file `apj.bst`, which, when used with *bibtex*, will now produce color-coded hyperlinked reference lists, where the journal name is purple and hyperlinked to the Digital Object Identifier (DOI) entry of the article, and the volume/page entry blue and hyperlinked to the NASA Astrophysics Data System abstract entry. Eventually, so many modifications were included, that a full-blown style file emerged (*likeapj* 1.0). This was first introduced with <https://arxiv.org/abs/1801.08544>. After further testing and additional improvements, we are making the class and bibliography style files of version 1.1 publicly available via this document. This is the latest version and can also be found on <https://github.com/qtast/likeapj/releases/latest>. Readers interested in a quick guide can go straight to Sec. 3.

## 2. Implementation

*likeapj* is built on top of AAST<sub>E</sub>X v6.1. Thus, all new functionality of that package<sup>2</sup> should work. Items introduced in AAST<sub>E</sub>X v6.2<sup>3</sup> may not work. In particular Research Note style is not supported. Only *ApJ*, *ApJS*, *ApJL*, *PASP* styles are supported. However, other AAST<sub>E</sub>X v6.2 changes are already introduced by *likeapj*. As of January 18, 2019 sixty three individual adjustments have been introduced. We present an overview of features introduced below, which corresponds to the condensed summary presented in Table 1.

### 2.1. Overview of Changes

1. The running head now has options for four AAS journals.
2. Appendix is in two-column style.
3. Appendix section titles have correct font and overall appearance.
4. Page numbers are centered at the bottom of all pages.
5. The style of the running head closely matches AAS style in font.
6. The main title is in bold and lower case.
7. The font for the author list has been adjusted.
8. The abstract has no indentation, is centered, and has smaller width than the main text; its title is lower case.
9. *Keywords* has been replaced by *Key words*; the width and offset of the key words text from the next Section below have been adjusted.
10. Footnotes now feature a horizontal rule with appropriate width and length.
11. Footnote separations from main text have been adjusted.
12. Footnote numbers are no longer indented.
13. Section titles and numbers are in bold and lower case, as is appropriate.
14. Subsection titles and numbers are in italics and lower case, as is appropriate.

<sup>1</sup> This introduction does not mean to be comprehensive or even fully accurate. The author lacks the resources to provide a proper history of journal formatting.

<sup>2</sup> See <https://journals.aas.org/aastex-revisionhistory/#.6.1>.

<sup>3</sup> See <https://journals.aas.org/aastex-revisionhistory/#.6.2>.

**Table 1.** Features introduced by *likeapj*

	Changes
1	New options for running head for four AAS journals.
2	Two column appendix.
3	Appendix section titles <b>Appendix A</b> etc.
4	Page number at center & bottom.
5	Running head font styles for four journals and short authors.
6	Front page title lower case, bold.
7	Eliminate forced white space after abstract.
8	Front page authors font.
9	Abstract: no indentation, centered, smaller width; <b>Abstract</b> is lower case title.
10	<i>Keywords</i> → <i>Key words</i> ; width matched to abstract; adjust space to Introduction below.
11	Footnote now used horizontal rule with correct width.
12	Decrease footnote separation from main text.
13	Footnote number not indented.
14	Section titles & numbers in bold and lower case.
15	Subsection titles & numbers in italics; lower case.
16	References: font fixed, two-column, continue from end of text.
17	<b>References</b> title centered over first column.
18	Footnote font.
19	<i>Facilities</i> font and no skip.
20	Bookmarked sections in pdf.
21	Table title centered; no italics; skip adjusted.
22	Table <b>Note</b> bold.
23	No big skip before <i>Received</i> etc.
24	<i>Received...</i> , <i>revised</i> , font/case adjusted.
25	Front page email instead of footnote now optional blue link in author list.
26	Several skips/spaces adjusted.
27	Readjust text width, column separation, text height, title width
28	References to Astronomy Letters (AstL) and Astronomische Nachrichten (AN) will be correctly hyperlinked and shown if <code>\\anl</code> and <code>\\anach</code> are used in the bib file.

**Note.** There are 63 individual changes, summarized in 28 items.

15. The font for the references list has been adjusted and the list is now two-column, naturally continuing from where the text ends.
16. The **References** title is centered over the first column of the reference list.
17. The footnote font has been adjusted.
18. The font for the *Facilities* entry has been adjusted and skips have been cancelled.
19. Sections are now bookmarked in the final pdf.
20. Table titles are centered, italics are cancelled, and the skip to content has been adjusted.
21. The text **Note** in tables is in bold by default.
22. Big skip before *Received*, etc removed.
23. The font and case for *Received...*, *revised...* have been adjusted.
24. e-mail can be included on the title page instead of footnote (but any e-mail will invite spam).
25. Several skip and space issues resolved.
26. Text width, column separation, text height, title width have been improved.
27. References to Astronomy Letters (AstL) and Astronomische Nachrichten (AN) will be correctly hyperlinked, provided the bib file entry uses `\\anl` and `\\anach`, respectively, in the journal entry field.

### 3. Guidelines

For guidance and example use, we recommend:

- The current document,
- preprint <https://arxiv.org/abs/1801.08544>, or
- preprint <https://arxiv.org/abs/1901.06464> (for Tzanavaris & Yaqoob (2018)). This is still adequate for examples but uses version 1.0 so it is not recommended that you use the associated `cls` file.

Place the two files `likeapj.cls` and `likeapj.bst` in your article directory and follow the instructions below, which can also be found at the top of `likeapj.cls`. Items in Sec. 3.1 take you a long way towards the desired result, so are pretty essential. The remaining items can provide some further impressive improvements.

#### 3.1. Items to place before `\begin{document}`

1. `\documentclass[twocolumn, apj]{likeapj}`  
Replace `apj` with one of `apjs`, `aj`, `pasp`, `apjl` or `noj` for no journal in running head.
2. A hack for linking only year in citations is provided in Appendix A.

### 3. `\usepackage{mathptmx}`

This gets consistent AAS-looking Times-like fonts both for text and math.

### 4. If you want to associated dates with submission stages use something like:

```
\received{\today}
\revised{2019 Jan 32}
\accepted{}
\published{}
```

#### 3.2. *Table related items*

### 1. The style maintains full functionality for AAST<sub>E</sub>X v6.1 tables, including longtable. Default row spacing is probably too large; you may want to consider using something like

```
{\renewcommand{\arraystretch}{0.85}}
```

right before the table LaTeX code to control this.

### 2. If the table comments use a different font size compared to the actual table values, include a new declaration right before the command `\tablecomments`, e.g.

```
\tabletypesize{\small}
\tablecomments{
```

### 3.3. *Appendix items*

To get the Appendix section heading correct, put `\\` right before the appendix section title text.

## 4. Summary and Conclusions

This work is entirely open source and may be distributed and/or modified under the conditions of the LaTeX Project Public License. This work is in no way endorsed by the American Astronomical Society and is provided as is in the hope that you may find it useful.

The author welcomes your comments, feedback, and suggestions, which are invaluable for further improving the code. Sadly, due to limited resources, although he might, he cannot promise to fix your issues.

This is essentially an extension of `emulateapj` and AAST<sub>E</sub>X v6.1. As such it rests on “the shoulders of giants”, whose work and open source products are highly appreciated. The author apologizes for not explicitly acknowledging the many people who contributed to these open source projects.

## References

- Markevitch, M. 1997, [ApJL](#), **483**, L17  
 Tzanavaris, P., & Yaqoob, T. 2018, [ApJ](#), **855**, 25

## Appendix A

### Linking Only Year in Citations

```

\usepackage{etoolbox}
\makeatletter
% Patch case where name and year are separated by aysep
\patchcmd{\NAT@citex}
  {\@citea\NAT@hyper@{
    \NAT@nmfmt{\NAT@nm}
    \hyper@natlinkbreak{\NAT@aysep\NAT@spacechar}{\@citeb\@extra@b@citeb}
    \NAT@date}}
  {\@citea\NAT@nmfmt{\NAT@nm}
    \NAT@aysep\NAT@spacechar\NAT@hyper@{\NAT@date}}{}{}

% Patch case where name and year are separated by opening bracket
\patchcmd{\NAT@citex}
  {\@citea\NAT@hyper@{
    \NAT@nmfmt{\NAT@nm}
    \hyper@natlinkbreak{\NAT@spacechar\NAT@@open@if*#1*\else#1\NAT@spacechar\fi}
    {\@citeb\@extra@b@citeb}
    \NAT@date}}
  {\@citea\NAT@nmfmt{\NAT@nm}
    \NAT@spacechar\NAT@@open@if*#1*\else#1\NAT@spacechar\fi\NAT@hyper@{\NAT@date}}
  {}{}
\makeatother

```