Lab 3 - LaTex

LaTex

A document preparation system

https://www.latex-project.org/

- Unix/Linux
  - latex or pdflatex (recommended)
- Mac
  - TeXShop (highly recommended)
    - Free
    - Download at

      http://pages.uoregon.edu/koch/texshop/obtaining.html
- Window
  - MiKTeX, based on recommendataion from LaTex page (https://www.latex-project.org/get/)

Main structure of LaTex

```
\documentclass[11pt,preprint]{aastex}

\begin{document}

\title{LaTeX template}

\author{Amy Lien$^{1}$}

\affil{$^1$NASA Goddard Space Flight Center, Greenbelt, MD 20771, USA}

\begin{abstract}
Abstract here.
\end{abstract}

\section{Introduction}

\end{document}
```

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A LaTex file has to have name ending in tex, e.g., *filename*.tex

Main structure of LaTex

```
\documentclass[11pt,preprint]{aastex}

\begin{document}

\title{L

\autho

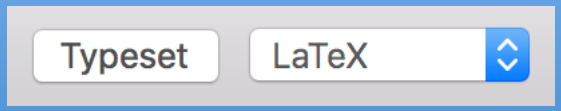
\affil{$                                                    USA}

\begin
Abstra
\end{a

\section{Introduction}

\end{document}
```

Unix/Linux: Compile LaTeX by typing
pdflatex filename
Mac – TeXShop:
Press **Typeset** with the **LaTex** option



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Main structure of LaTex

LaTeX template

Amy Lien[1]

[1]*NASA Goddard Space Flight Center, Greenbelt, MD 20771, USA*

ABSTRACT

Abstract here.

1. Introduction

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- **Document format/style**
- **aastex.cls**

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- **Style option in aastex**
  - **E.g., preprint, twocolumn….**

Adding citations and references

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\section{Introduction}
Data are from \citet{Paciesas99}.
Data are from the BATSE catalog \citep{Paciesas99}.

\bibliographystyle{apj}
\bibliography{ref}

\end{document}
```

→ Specifying the reference style.

(Need to include related style file (e.g., apj.bst) In the same folder.)

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This file needs to have name *.bib.

Here the reference file we use is called ref.bib

ref.bib

```
@ARTICLE{Paciesas99,
   author = {{Paciesas}, W.~S. and {Meegan}, C.~A. and {Pendleton}, G.~N. and
         {Briggs}, M.~S. and {Kouveliotou}, C. and {Koshut}, T.~M. and
         {Lestrade}, J.~P. and {McCollough}, M.~L. and {Brainerd}, J.~J. and
         {Hakkila}, J. and {Henze}, W. and {Preece}, R.~D. and {Connaughton}, V.
and
         {Kippen}, R.~M. and {Mallozzi}, R.~S. and {Fishman}, G.~J. and
         {Richardson}, G.~A. and {Sahi}, M.},
    title = "{The Fourth BATSE Gamma-Ray Burst Catalog (Revised)}",
  journal = {\apjs},
   eprint = {astro-ph/9903205},
 keywords = {CATALOGS, GAMMA RAYS: BURSTS, GAMMA RAYS: OBSERVATIONS, Catalogs, G
amma Rays: Bursts, Gamma Rays: Observations},
     year = 1999,
    month = jun,
   volume = 122,
    pages = {465-495},
      doi = {10.1086/313224},
   adsurl = {http://adsabs.harvard.edu/abs/1999ApJS..122..465P},
  adsnote = {Provided by the SAO/NASA Astrophysics Data System}
}
```

- This information is from ADS, under the link of **Bibtex entry for this abstract** for each paper

- **The name you gave to reference this paper in your LaTex file**

ref.bib

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→ Specifying the file with a list of reference.

This file needs to have name *.bib.

Here the reference file we use is called ref.bib

Compile LaTex

- In Unix/Linux
  - Compile latex:

    pdflatex *filename*
  - Compile reference (ref.bib)

    bibtex *filename*
  - Recompile latex TWICE:

    pdflatex *filename*

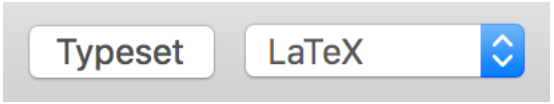
    pdflatex *filename*
  - View compiled pdf file:

    okular *filename.pdf*

Compile LaTex

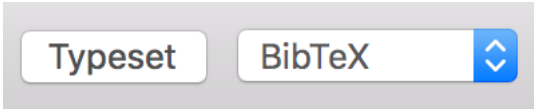
- In Mac-TeXShop:
  - Compile latex:

    Press Typeset with LaTex option



  - Compile reference (ref.bib)

    Press Typeset with BibTex option



  - Recompile latex TWICE:

    Press Typeset TWICE with LaTex option

  - View compiled pdf file:

    A window that has the compiled pdf version will popup automatically

LaTeX template

Amy Lien[1]

[1]*NASA Goddard Space Flight Center, Greenbelt, MD 20771, USA*

ABSTRACT

Abstract here.

1. Introduction

Data are from Paciesas et al. (1999). Data are from the BATSE catalog (Paciesas et al. 1999).

REFERENCES

Paciesas, W. S., et al. 1999, ApJS, 122, 465

Adding citations and references

LaTeX template

Amy Lien[1]

[1]*NASA Goddard Space Flight Center, Greenbelt, MD 20771, USA*

ABSTRACT

Abstract here.

\citet{Paciesas99}

\citep{Paciesas99}

1. Introduction

Data are from Paciesas et al. (1999). Data are from the BATSE catalog (Paciesas et al. 1999).

REFERENCES

Paciesas, W. S., et al. 1999, ApJS, 122, 465

Basic syntax

- Quotation - ``ABC''
- Comment - %

  (line start with this symbol will be ignore when compiling)
- Math format in text: $...$
  - $F > 10^{-2}$ → $F > 10^{2}$
  - $L_{\rm obs} = 10^{52} \ \rm erg \ s^{-1}$

    (**\rm** – set the text to Roman font)

    (**** - add extra space)

    → $L_{obs} = 10^{52}$ erg s^{-1}

Including figure

```
%Including figures in LaTeX
\begin{figure}[!h] % [h] tell LaTeX to put the figure "here" at this specific location in text. However, some
\begin{center} % set the location of the figure to be at the center.
\includegraphics[width=0.57\textwidth]{T90_all_with_limit_all_missions.pdf} % set the width of the figur
\end{center}
\caption{
$T_{90}$ distribution for {\it Swift}/BAT (top panel), {\it Fermi}/GBM (middle panel), and {\it CGRO}/BAT
For the BAT GRBs, only bursts with successfully determined are included in the plot.
$T_{90}$ for {\it Fermi}/GBM bursts are obtained from the {\it Fermi} GBM burst catalog
\citep{Gruber14, vonKienlin14}.
$T_{90}$ for {\it CGRO}/BATSE bursts are from The Fourth Gamma-ray Bursts Catalog \citep{Paciesa
Distributions using the upper and lower bounds of the $T_{90}$ uncertainty range are also plotted for c
The bin size of this plot is 0.2 in log scale.
This figure is adapted from \citet{Lien16}.
}
\label{fig:T90} %This is the reference name for this figure, which is used when you reference this figure
\end{figure}
```

Including figure

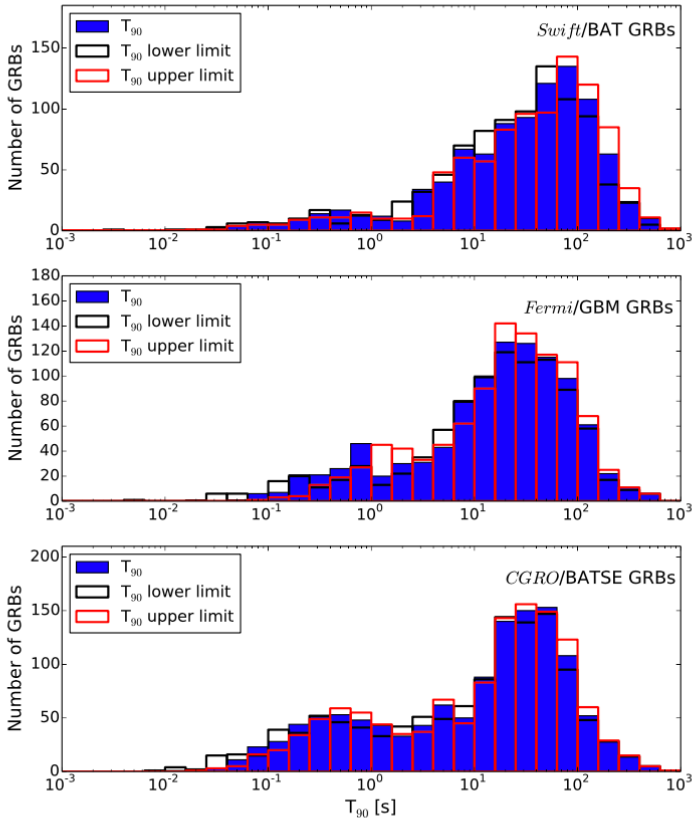


Fig. 1.— T_{90} distribution for *Swift*/BAT (top panel), *Fermi*/GBM (middle panel), and *CGRO*/BATSE (bottom panel). For the BAT GRBs, only bursts with successfully determined are included in the plot. T_{90} for *Fermi*/GBM bursts are obtained from the *Fermi* GBM burst catalog (Gruber et al. 2014; von Kienlin et al. 2014). T_{90} for *CGRO*/BATSE bursts are from The Fourth Gamma-ray Bursts Catalog (Paciesas et al. 1999). Distributions using the upper and lower bounds of the T_{90} uncertainty range are also plotted for comparison. The bin size of this plot is 0.2 in log scale. This figure is adapted from Lien et al. (2016).

Including figure (wrapped around text)

```
We can also include figure that is wrapped around text. Here is an example.
% set figure to be wrapped around text.
\begin{wrapfigure}{r}{0.4\textwidth}
\vspace{-25pt}  % vspace can add or reduce space between text/figures.
\begin{center}
\includegraphics[width=0.3\textwidth]{T90_remake.pdf}
\end{center}
\vspace{-25pt}
\caption{
Figure caption.
}
\label{fig:T90_wrap}
\end{wrapfigure}
Gamma-ray bursts (GRBs) have been traditionally classified as
```

Including figure (wrapped around text)

We can also include figure that is wrapped around text. Here is an example. Gamma-ray bursts (GRBs) have been traditionally classified as long and short bursts based on their observed pulse duration T_{90}, which represents the time period that includes 90% of the burst photon counts. The commonly adopted separation is $T_{90} = 2$ seconds based on the GRBs detected by *CGRO*/BATSE (the GRB instrument prior to *Swift*; Kouveliotou et al. 1993), as shown in the bottom panel of Fig. 1. Observational evidence has implied different physical origins for these two categories of bursts. While it is now widely accepted that most long duration bursts are produced by the core-collapse of rapidly rotating massive stars (collapsars; Woosley & Bloom 2006), the nature of short GRB progenitors is less certain, and remains one of the most challenging, and pressing questions in the GRB field.

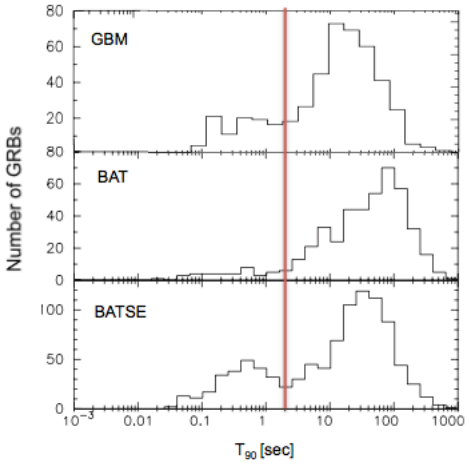


Fig. 2.— Figure caption.

Equation

```
\begin{equation}
\label{eq:PL}
N(E) = C \times K^{\rm PL} \bigg(\frac{E}{E_{\rm norm}} \bigg)^{\alpha^{\rm PL}},
\end{equation}
```

Table

```
\begin{table}[!h]
\caption{\label{tab:example} Table caption.}
\begin{center}
\begin{tabular}{|c|c|} % The format of the table. E
\hline\hline
%%%%%% headings go here
Column1 & Column2\\
\hline
\hline
A & 1 \\
\hline
B & 2 \\
\hline
C& 3 \\
\hline
D & 4 \\
\hline\hline
\end{tabular}
\end{center}
\end{table}
```

Explore many many more useful commands

- The latex template at

  /n/ursa/A288C/alien/lab03_latex/latex_template/latex_template.tex

- Useful links
  - LaTex − Wikibook:

    https://en.wikibooks.org/wiki/LaTeX
  - AASTeX:
    http://journals.aas.org/authors/aastex/aasguide.html

Lab 3 Worksheet

You are required to print out and hand in the compiled pdf file from your LaTeX document at the end of the lab.

1. In your home directory, create a direcory called `lab03_latex`.
2. Copy the folder `/n/ursa/A288C/alien/lab03_latex/latex_template` to the directory `lab03_latex` you just created.
3. Go to the `/latex_template` directory under your `lab03_latex`. Compile the template LaTeX file by typing

   pdflatex latex_template

4. Open the compiled pdf file by typing

   okular latex_template.pdf

5. You would notice that there are some question marks in the text. These are where the citations should be, because we have not compiled the LaTeX file with the reference file (ref.bib) yet. Do this by typing

   bibtex latex_template

   You will see that two more files, latex_template.blg and latex_template.bbl, are created.

6. Now recompile the LaTeX file to include the citations by typing

   pdflatex latex_template

   pdflatex latex_template

   Note that you have to do this twice for LaTeX to implement the citations.

7. Open the compiled pdf file again to check if the question marks are gone.
8. Go back to your `lab03_latex` directory, create a new LaTeX file named <your_name>.tex in your `lab03_latex` directory that includes the following items.

   (a) Title - use the title you created in the last homework assignment.

   (b) Your name

(c) Your affiliation (e.g., Department of Astronomy, University of Maryland, College Park, MD 20742, USA)

(d) A section named "Introduction"

Copy the text you wrote in last homework assigment (except the complete references) to the "Introduction" section in this LaTeX file.

9. Copy the two style files, aastex.cls and apj.bst, from the `latex_template` folder to the `lab03_latex` directory.

   - aastex.cls needs to be included in the same folder as the LaTeX file becaure we use the aastex format. This is specified in the documentclass command in the LaTeX file.
   - apj.bst needs to be included in the same folder as the LaTeX file because we adopt the reference style to be in ApJ format. This is specified in the bibliographystyle command in the LaTeX file.

10. Compile the LaTeX file into a pdf file. Open the pdf file to check the result.

11. Add in the complete references of your citations in the ref.bib file.

    - The reference format required for the ref.bib file can be found under the link "Bibtex entry for this abstract" when you search the article in ADS.

12. Add the following LaTeX commands in your LaTeX file to include your references.

```
\bibliographystyle{apj}
\bibliography{ref}
```

13. Compile the LaTeX file into a pdf file including the references. Open the pdf file to check if references are correctly places.

14. Copy the sky map of gamma-ray bursts detected by *Swift* form the following location `/n/ursa/A288C/alien/lab03_latex/latex_template/Swift_GRB_all_sky_map.pdf` to your `lab03_latex` directory.
    Add this figure in your LaTeX file, and compile your LaTeX file into a pdf file. Open the pdf file to check the result.
    Try both the *includegraphics* command and *wrapfigure* command. Select the one you like better.

15. Print out the pdf file and turn it in at the end of the lab.