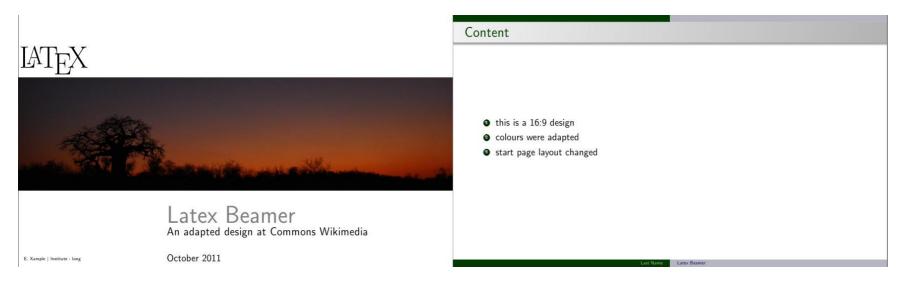# Introducing LaTeX

- document preparation system based on TeX
   (Donald Knuth 1978; Leslie Lamport 1984)

- standard for publishing in math and physical sciences

- good for equations, tables, figures, references

- ASCII text with good portability and flexibility

- Windows, Linux, OS X: http://www.latex-project.org

- example:

```
\begin{equation}
\begin{array}{rcccc}
p(x) &=& { {(x-x_2)(x-x_3)} \over {(x_1-x_2)(x_1-x_3)} } y_1  &+&
        { {(x-x_1)(x-x_3)} \over {(x_2-x_1)(x_2-x_3)} } y_2   \\
&&    &+& { {(x-x_1)(x-x_2)} \over {(x_3-x_1)(x_3-x_2)} } y_3
\end{array}
\label{LagrangePoly}
\end{equation}
```

LaTeX demo

- easy interface: TeXShop (OS X), proTeXt (Windows), Kile (Linux), online: http://sharelatex.com ,
  http://overleaf.com

- LyX: Word/LaTeX hybrid: good for notetaking

- see `latex_demo.tex`

- see further resources on Canvas

- Beamer: create powerpoint-like presentations

LaTeX equations and code listing

- equations:
  - inline with text: `Newton's law is $F = ma$.`
  - separate, numbered line:
    ```
    \begin{equation}
    F=ma
    \end{equation}
    ```
- include Python code with tabs, etc.:
  - at top: `\usepackage{listings}`
    ```
    \begin{lstlisting}
    Put your code here
    \end{lstlisting}
    ```

Formal structure of scientific reports

- **Abstract:** paragraph synopsis for short attention spans
- **Introduction** (tell a story…) **:**
  - general background on topic, for non-specialists
  - what has been done before
  - open questions ("why?")
  - what this paper will do ("how?" incl. why this method for this problem)
- **Methods:**
  - explain theoretical motivation / derivation for methods
  - include <u>tests</u> that the methods work (calibrations)
- **Results and Discussion:** "what" you found, "what" it means
- **Conclusions:** write as a continuation of intro for someone who skipped to the end (summarize what was learned)
- **References, Figures, Tables**
- **See Example Report on Canvas**

Project presentations

- **structure** similar to report :
  – tell a story (why? how? what?)
  – background, methods, results, conclusions
- **format:**
  – Powerpoint, Google Slides, Prezi, Keynote, Beamer, etc.
  – original presentation or PDF export
- **style:**
  – one idea and one image per slide
  – de-clutter and use large fonts
  – see example on Canvas
- **rehearse** in front of someone else! (~**10** min.)

Accessing physics & astronomy literature

- arXiv: free preprint/reprint server (since 1991)
  http://arxiv.org - votes on http://voxcharta.org

- INSPIRE (not just high-energy physics):
  http://inspirehep.net

- Web of Knowledge: http://www.webofknowledge.com

- Google scholar: http://scholar.google.com

- SJSU library physics & astronomy research portal:
  http://libguides.sjsu.edu/physics_astronomy

- Astrophysics Data System (ADS):
  http://adsabs.harvard.edu/abstract_service.html

- students' digests of physics & astro research results:
  http://physics.aps.org http://astrobites.org