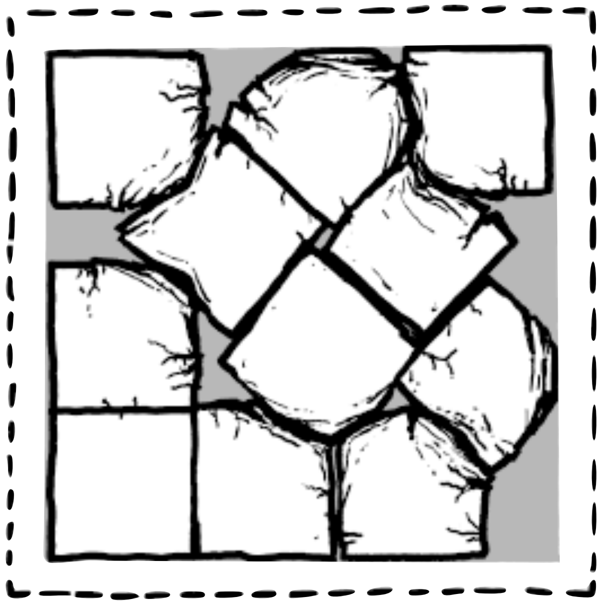
10 common misconceptions

about LaTeX



BAPTISTE AUGUIÉ

SCPS 03/2023


I sent you the manu-
s c r i p t
in LATEX, right?
in LATEX, right?

A template for Physics Hons reports

Lise Meitner[1,2,3], Pierre Curie[4], and Marie Curie[5,6,4]

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[2]University of Berlin
[3]Manne Siegbahn Institute

[4]École Normale Supérieure
[5]University of Paris
[6]Institut du Radium

March 13, 2023

Abstract

Lorem ipsum dolor sit amet, iudicabit posidonium theophrastus ne nec, atqui dolor ex pro. Porro debitis his eu. Zril diceret nominati quo ei, et vel ludus nonumy vidisse. Ex tota meliore persecuti mel, sea ne nonumes blandit liberavisse. Mea rebum discere ea, utamur constituto ei usu, mei quas laoreet ea. Nemore quaeque ne mea, alii tritani sit at. Vix eu aeque iuvaret, cu inani nulla mediocrem sed, cum at nostro pertinax. At per agam vocent periculis.

Contents

1 Introduction

Lorem ipsum dolor sit amet, *"iudicabit posidonium theophrastus"* ne nec, atqui dolor ex pro. Porro debitis his eu. Zril diceret nominati quo ei, et vel ludus nonumy vidisse. Ex tota meliore persecuti mel, sea ne nonumes blandit liberavisse [1].

$$\nabla \times \mathbf{B} = \frac{1}{c}\left(4\pi\mathbf{J} + \frac{\partial \mathbf{E}}{\partial t}\right) \quad (1)$$

Mea rebum discere ea, utamur constituto ei usu, mei quas laoreet ea. Nemore quaeque ne mea, alii tritani sit at. Vix eu aeque iuvaret, cu inani nulla mediocrem sed, cum at nostro pertinax. At per agam vocent periculis (Eq. 1).

Eu ignota epicuri voluptatibus sit $E = mc^2$. Solum labores aliquando te usu, vim vide justo eu, ad nec dicta ridens. Nisl aliquip no ius, decore fierent nam ut, et dolorum disputando dissentiunt est. In nam sonet adipisci temporibus. Ut enim summo argumentum pri, ea detraxit adolescens intellegam sed [2–5].

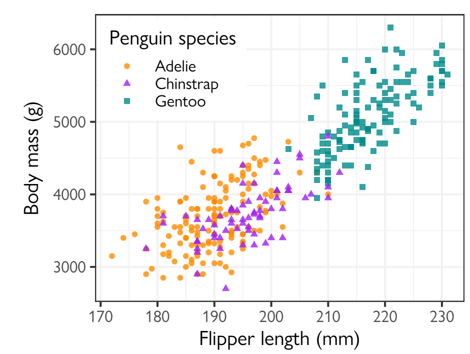

Figure 1: Lorem ipsum dolor sit amet, iudicabit posidonium theophrastus ne nec, atqui dolor ex pro. Porro debitis his eu. Zril diceret nominati quo ei, et vel ludus nonumy vidisse. Ex tota meliore persecuti mel, sea ne nonumes blandit liberavisse.

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2 Methods

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Table 1: Lorem ipsum dolor sit amet, iudicabit posidonium theophrastus ne nec, atqui dolor ex pro. Porro debitis his eu.

Models	Metric 1			Metric 2
	precision	α	$\beta \neq \alpha$	$\gamma \geq \alpha$
model 1	0.67	0.8	0.729	0.75
model 2	0.8	0.9	0.847	0.85

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3 Results

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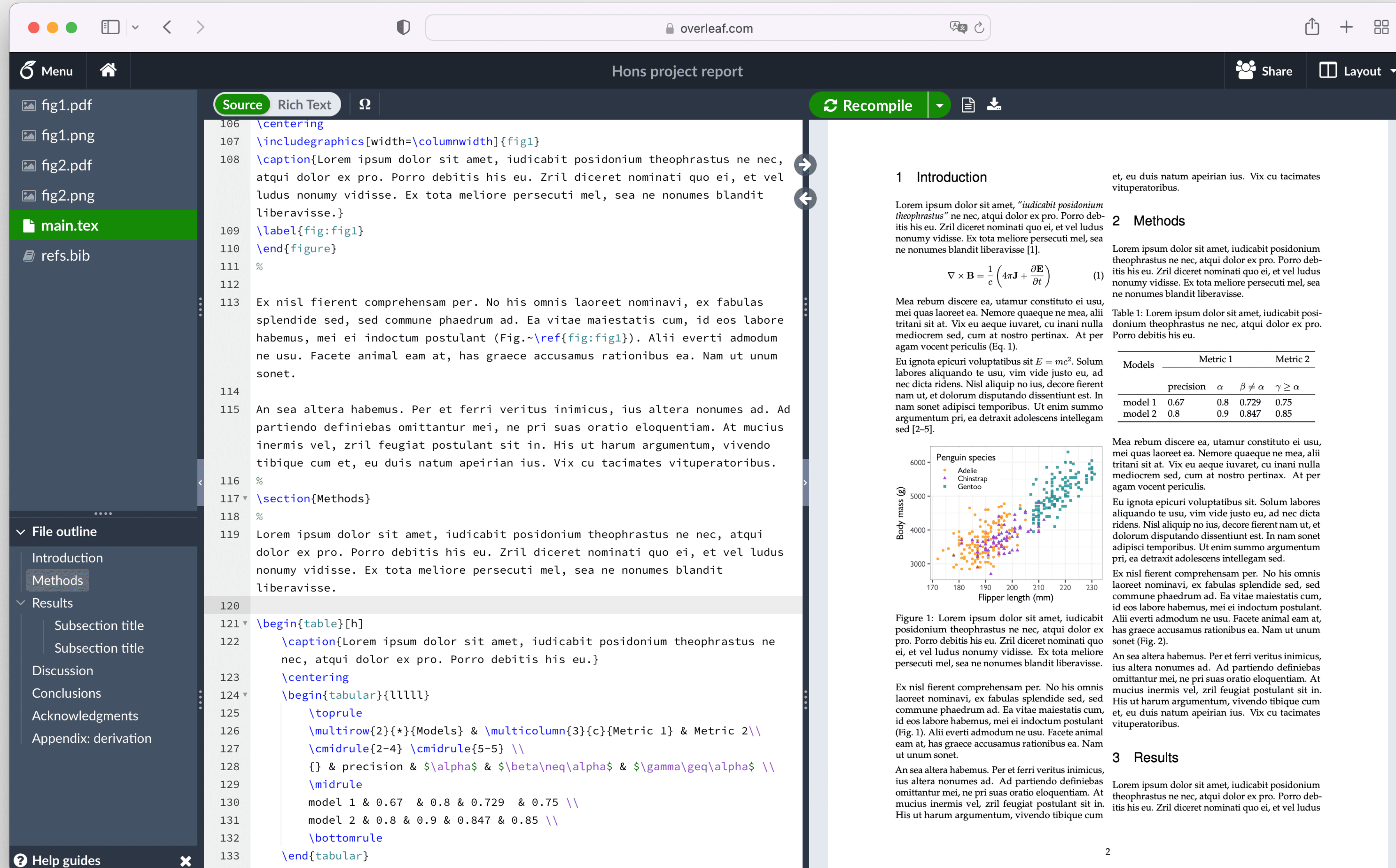
1· TOO DIFFICULT TO INSTALL



https://www.overleaf.com/read/ptfwfrfbpjvn

2· WRITING ANYTHING IS SUPER COMPLICATED

```latex
\documentclass{article}
\begin{document}

This is all I have to say.

\end{document}
```

https://www.overleaf.com/read/hstysntwtsqm

3· THE SYNTAX IS OBSCURE

Title	`\title{}, \author{}, \date{}`
Sections	`\chapter{}, \section{}, \subsection{}`
Formatting	`\textit{}, \textbf{}`
Math	`\int_0^\infty \frac{\alpha}{x^2} dx`
Bibliography	`\cite{}, \bibliography{}`
References	`\label{}, \ref{}`
Figures	`\includegraphics{figure.png}`

4· ANYTHING YOU PRODUCE WILL LOOK GREAT

Making scientific posters easily with $\LaTeX$

Author A & Author B
University College London

> Introduction

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> Method

Sift the flour and salt into a large mixing bowl with a sieve held high above the bowl so the flour gets a airing. Now make a well in the centre of the flour and break the eggs into it. Then begin whisking the eggs - any sort of whisk or even a fork will do - incorporating any bits of flour from around the edge of the bowl as you do so.

Next gradually add small quantities of the milk and water mixture, still whisking (don't worry about any lumps as they will eventually disappear as you whisk). When all the liquid has been added, use a rubber spatula to scrape any elusive bits of flour from around the edge into the centre, then whisk once more until the batter is smooth, with the consistency of thin cream. Now melt the 50g/2oz of butter in a pan. Spoon 2 tbsp of it into the batter and whisk it in, then pour the rest into a bowl anduse it to lubricate the pan, using a wodge of kitchen paper to smear it round before you make each pancake.

Now get the pan really hot, then turn the heat down to medium and, to start with, do a test pancake to see if you're using the correct amount of batter. I find 2 tbsp is about right for an 18cm/7in pan. It's also helpful if you spoon the batter into a ladle so it can be poured into the hot pan in one go. As soon as the batter hits the hot pan, tip it around from side to side to get the base evenly coated with batter. It should take only half a minute or so to cook; you can lift the edge with a palette knife to see if it's tinged gold as it should be. Flip the pancake over with a pan slice or palette knife - the other side will need a few seconds only - then simply slide it out of the pan onto a plate. Stack the pancakes as you make them between sheets of greaseproof paper on a plate fitted over simmering water, to keep them warm while you make the rest.

To serve, spinkle each pancake with freshly squeezed lemon juice and caster sugar, fold in half, then in half again to form triangles, or else simply roll them up. Serve sprinkled with a little more sugar and lemon juice and extra sections of lemon.

> Maths

Malthusian growth model:

$$P(t) = P_0 e^{rt}$$

Verhulst equation:

$$P(t) = \frac{K P_0 e^{rt}}{K + P_0 (e^{rt} - 1)}$$

Lotka-Volterra equations:

$$\frac{dx}{dt} = x(\alpha - \beta y)$$

$$\frac{dy}{dt} = -y(\gamma - \delta x)$$

Michaelis-Menten:

$$\frac{d[P]}{dt} = V_{max} \frac{[S]}{K_m + [S]}$$

> Lists and tables

Itemize:

- Item 1
- Item 2
- Item 3

Description:

Domain Eukaryota
Kingdom Animalia
Phylum Chordata
Class Mammalia
Order Primates
Family Hominidae
Genus *Homo*
Species *H. Sapiens*

Five-day forecast:

Day	Summary	Max day	Min night	Wind (mph)	Visibility
Saturday	Sun/cloud	16	10	6	poor
Sunday	Rain	14	7	3	poor
Monday	Showers	13	6	21	poor
Tuesday	Sun	15	9	7	good
Wednesday	Showers	17	12	6	moderate

> Discussion

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PENGUIN SLIDING

A POSTER WITH QUARTO • MARKDOWN • KNITR • PANDOC • YAML • LUA • XELATEX

Chin Strap
Gen Too
Adé Lie

10/23/22

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$$\alpha = \beta \tag{1}$$

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AN ANCIENT ART

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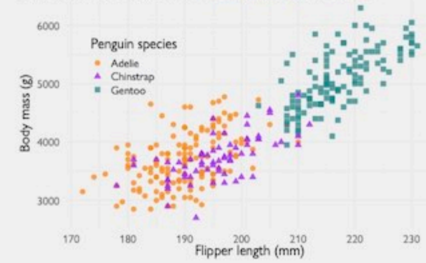
Penguin size, Palmer Station LTER
Flipper length and body mass for Adélie, Chinstrap and Gentoo



Everything is on the table

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species	length	depth	flipper	mass	sex	year
Adelie	39.1	18.7	181	3750	male	2007
Adelie	39.5	17.4	186	3800	female	2007
Adelie	40.3	18.0	195	3250	female	2007
Adelie	NA	NA	NA	NA	NA	2007
Adelie	36.7	19.3	193	3450	female	2007
Adelie	39.3	20.6	190	3650	male	2007

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TECHNICALLY SPEAKING

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$$\begin{aligned} E &= T + U \\ &= -\frac{GmM}{|\mathbf{r}|} + \frac{1}{2} m |\mathbf{v}|^2 \\ &= m\left(-\frac{GM}{|\mathbf{r}|} + \frac{|\omega \times \mathbf{r}|^2}{2}\right) \\ &= -\frac{GmM}{2|\mathbf{r}|} \end{aligned}$$

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$$dP\left(1 - M^2\right) = \rho V^2 \left(\frac{dA}{A}\right) \tag{2}$$

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$$\frac{\partial \mathbf{u}}{\partial t} + (\mathbf{u} \cdot \nabla)\mathbf{u} = -\frac{1}{\rho}\nabla P + \nu \nabla^2 \mathbf{u}$$

More nonsense

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$$\iiint Q\, dV + \iint F\, d\mathbf{A} = 0$$

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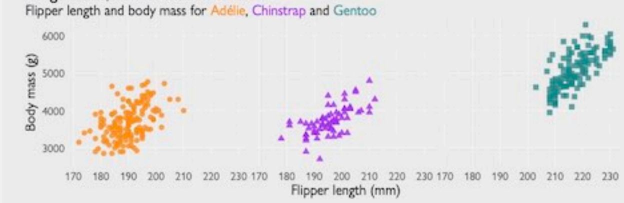
Penguin size, Palmer Station LTER
Flipper length and body mass for Adélie, Chinstrap and Gentoo



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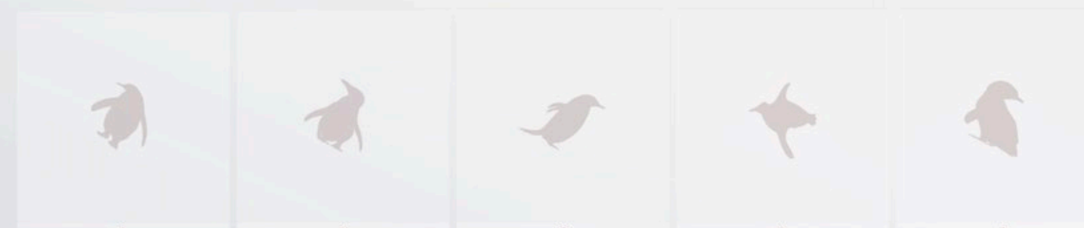

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Mollit anim id est laborum,

```
```{r}
head(penguins) ▷ tail()
```
```

REFERENCES

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2. Gorman, K. B., Williams, T. D. & Fraser, W. R. Ecological sexual dimorphism and environmental variability within a community of antarctic penguins (genus pygoscelis). *PLOS ONE* **9,** e90081– (2014).
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Acknowledgments

Thanks for that.

5· IT WILL SAVE YOU TIME

Gändälf thë Grëy

Wizard • pointy-hatted • pipe smoker
Maia, bearer of Narya
Born before Arda was created

LOCATION	Valinor, Arda
MOBILE	flying moths
EMAIL	mithrandir@istari.me
SKYPE	gandalf
WEBSITE	lotr.wikia.com/wiki/gandalf

Sent by the Valar to combat the threat of Sauron upon Middle-Earth. Out of activity since the Third Age. A true wizard when it comes to fireworks, dragons and Balrogs, I also enjoy a good smoke. When things get too hot even for me, I know to delegate.

Work experience

Fourth Age — **RETIRED WIZARD** — MANWË'S TEAM, VALINOR

Smoking and reminiscing about the great battles of the past
Hanging out with Bilbo and Frodo, Lady Galadriel, Elrond, and many elves

Third Age — **GREY, THEN WHITE WIZARD** — POLICY ADVISER & GUIDE, MIDDLE EARTH

Sent by the Valar to help Men and Elves in the fight against Sauron
Advised the rulers of Middle-Earth, often against their bad judgment
Collaborated with Elrond, Lady Galadriel, and Aragorn
Argued with a Balrog that they *shall not pass*
Sent back with a white cape to finish the job

5· IT WILL SAVE YOU TIME

The letter S

Donald E. Knuth

The Mathematical Intelligencer **2**, 114–122 (1980)

$x_1 = 4.5u;\quad y_1 = 9u;$
$x_2 = 6u;\quad y_2 - 5.5u =$
$\quad \mathbf{sqrt}((3.5u)(3.5u) - (x_2 - 4.5u)(x_2 - 4.5u));$
$\mathbf{draw}\ 1\{y_1 - 5.5u, 4.5u - x_1\}\,..$
$\quad 2\{y_2 - 5.5u, 4.5u - x_2\};$
$x_3 = 6.5u;\quad y_3 = 8.5u;$
$x_4 = 6u;\quad y_4 = 7u;$
$x_5 = (6 + \frac{16}{17})u;\quad y_5 = (8 + \frac{13}{17})u;$
$\mathbf{draw}\ 3\{9u - y_3, x_3 - 6.5u\}\,..$
$\quad 5\{9u - y_5, x_5 - 6.5u\};$
$\mathbf{draw}\ 4\,..\,5;$
$x_6 = 4u;\quad y_6 = 9u;$
$x_7 = 3u;\quad 7u - y_7 =$
$\quad \mathbf{sqrt}((2u)(2u) - (x_7 - 4u)(x_7 - 4u));$
$\mathbf{draw}\ 6\{7u - y_6, x_6 - 4u\}\,..\,7\{7u - y_7, x_7 - 4u\};$
$x_8 = 5u;\quad y_8 = 4u;\quad \mathbf{draw}\ 7\,..\,8;$
$x_9 = 3.5u;\quad y_9 = 6u;$
$x_{15} = 4.5u;\quad y_{15} - 7.125u =$
$\quad \mathbf{sqrt}((x_9 - 4.5u)(x_9 - 4.5u) +$
$\qquad (y_9 - 7.125u)(y_9 - 7.125u));$
$\mathbf{draw}\ 4\{7.125u - y_4, x_4 - 4.5u\}\,..\,15\,..$
$\quad 9\{7.125u - y_9, x_9 - 4.5u\};$
$x_{10} = 6u;\quad y_{10} = 4.5u;\quad \mathbf{draw}\ 9\,..\,10;$
$x_{11} = 3u;\quad y_{11} = .5u;$

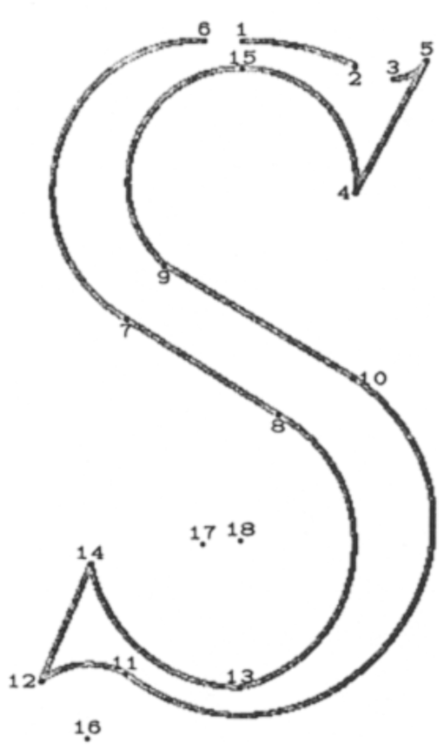


Fig. 3. The METAFONT program in the text will produce this rendition of Torniello's S.

6· FONTS / TABLES / LAYOUT /... look ugly

Orc	LVL	LDR	ATT	DEF	INI	SPD	HP	DMG
Goblin	2	35	16	10	4	2	20	2–4
Furious Goblin	2	40	14	14	6	3	38	3–8
Orc	3	60	16	17	4	2	65	7–10
Catapult	3	120	33	15	4	2	80	5–9
Veteran Orc	4	140	25	25	6	3	110	15–20
Shaman	4	200	24	32	5	3	160	15–18

Neutral	LVL	LDR	ATT	DEF	INI	SPD	HP	DMG
Thorn-Hunter	1	8	4	1	2	3	5	1–2
Thorn-Warrior	1	8	4	3	4	3	8	1–3
Fire Dragonfly	1	9	3	1	5	3	6	1–3
Lake Dragonfly	1	9	3	1	6	4	6	1–3
Devilfish	1	12	6	4	6	3	10	1–3
Venomous Spider	1	12	5	1	4	3	10	2–3
Cave Spider	1	14	4	4	2	3	14	2–4
Hyena	2	20	8	8	4	3	14	3–4
Pirate	2	25	8	4	4	3	20	3–5
Swamp Snake	2	28	12	8	4	2	25	3–5
Fire Spider	2	30	12	12	6	3	27	4–5
Snake	2	30	14	8	5	2	28	3–6

8	1	6
3	5	7
4	9	2

		Rank				Total
		A	B	C	Other	
Type	type 1	10	21	6	3	40
	type 2	8	14	5	2	29
Total		18	35	11	5	69

name	*foo*			
Models	A	B	C	D
Model X	X1	X2	X3	X4
Model Y	Y1	Y2	Y3	Y4

tex.stackexchange.com/questions/112343/beautiful-table-samples

6· FONTS / TABLES / LAYOUT /... look ugly

nitens.org/taraborelli/latex

7· CANNOT WORK COLLABORATIVELY

~~Investigating the convergence~~ Convergence of the T-matrix method ~~beyond~~ free of numerical ~~problems~~instabilities for spheroids

W. R. C. Somerville,[1] B. Auguié,[1] and E. C. Le Ru[1,*]

[1] *The MacDiarmid Institute for Advanced Materials and Nanotechnology, School of Chemical and Physical Sciences, Victoria University of Wellington, PO Box 600, Wellington 6140, New Zealand.*

compiled: November 28, 2014

The convergence behavior of the T-matrix method as calculated by the extended boundary condition method (EBCM) is studied, in the case of light scattering by spheroidal particles. By making use of a new formulation of the EBCM integrals ~~that specifically~~ specifically designed to avoid numerical cancellations, we are able to obtain accurate matrices up to high multipole order, and study the effect of changing this order on both the ~~matrix entries~~individual matrix elements, as well as ~~calculated physical properties~~derived physical observables. Convergence of near- and far-field scattering properties with a relative ~~accuracy~~ error of 10^{-15} is demonstrated over a large parameter space in terms of size, aspect ratio, and particle refractive index. This study demonstrates the capability of the ~~T-matrix~~T-matrix/EBCM method for fast, efficient, and numerically stable electromagnetic calculations on spheroidal particles with an accuracy ~~rivaling that of Mie theoryfor sphere~~comparable to Mie theory.

OCIS codes: (290.0290) Scattering; (290.4020) Mie theory; (290.5850) Scattering, particles; (000.4430) Numerical approximation and analysis ; (260.2110) Electromagnetic optics .

http://dx.doi.org/10.1364/XX.99.099999

1. Introduction

The T-matrix method, as ~~calculated by the~~ originally formulated by Waterman [1] , also known as extended boundary condition method (EBCM~~, also called the~~) or null-field method~~)~~, is considered ~~as~~ to be one of the most efficient semi-analytical approaches ~~for calculations of~~ to model electromagnetic scatter-

conservation [13] . As shown recently, the convergence properties of Mie theory are relatively simple and highly accurate results (e.g. 10^{-15} relative ~~precision~~ error in double precision) can be straightforwardly obtained over a large parameter range (of size and material) [14]. In contrast to Mie theory however, the EBCM suffers from a number of numerical instabili-

7. CANNOT WORK COLLABORATIVELY

```
-\subsection{Dimer of interacting dyes}
-\label{subsec:dimer}
-%

 \begin{figure}[!htpb]
 \centering
 \includegraphics[width=\columnwidth]{fig2}
 \caption{Source}\label{fig:dimer}
 \end{figure}

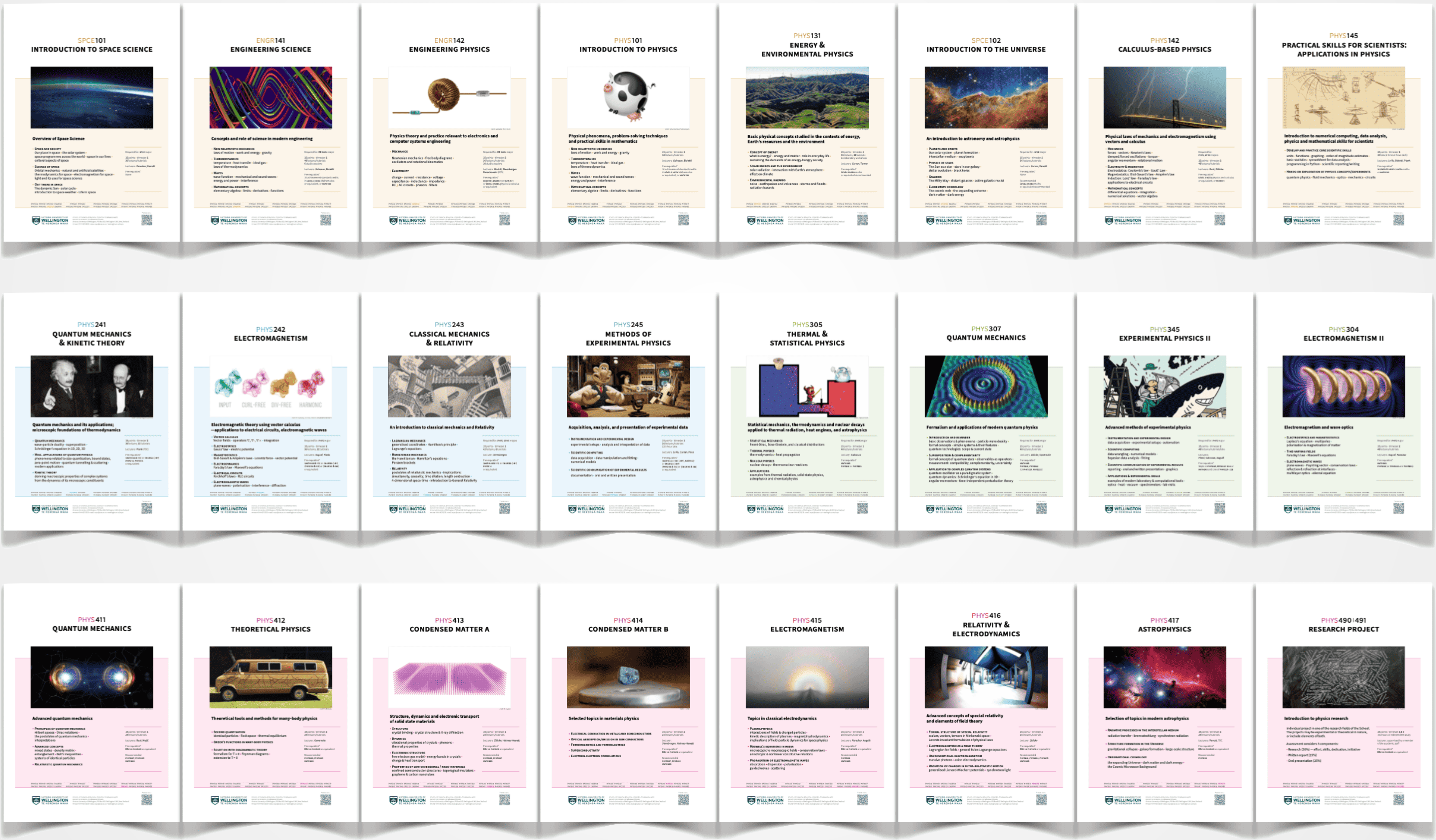
-Cf J-aggregates, and related work on infinte planar layers.
```

```
+% \subsection{Dimer of interacting dyes}
+% \label{subsec:dimer}
+The coupled-dipole equations governing the optical response of point dipoles in a homogeneous, isotropic, and non-absorbing medium are derived in Appendix A. We first consider a dimer configuration, with the two molecules described by uniaxial tensors (Fig 2).

 \begin{figure}[!htpb]
 \centering
 \includegraphics[width=\columnwidth]{fig2}
 \caption{Source}\label{fig:dimer}
 \end{figure}

+% Cf J-aggregates, and related work on infinte planar layers.
+This configuration has been studied extensively, as many dye molecules tend to dimerise at sufficiently high concentrations. The resulting dimers are known as J- or H-aggregates, depending on the relative orientation of the two interacting dipoles. With decreasing separation, the molecular resonances interact and hybridise; the spectral lineshape exhibits a red-shift (a) or a blue-
```

8· OVERKILL FOR SIMPLE DOCUMENTS



8· OVERKILL FOR SIMPLE DOCUMENTS

```
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title: "Melting in extreme environments"
author: "Dr Elke Pahl"
affiliation:
   - "Department of Physics"
   - "The University of Auckland"
venue: "LBLT118"
event: "Friday 28 February, 12pm"
---

Strong magnetic fields and extremely high pressures
change the properties of materials, drastically
challenging our everyday intuition. Under high
pressure, nature is quite inventive in finding more
compact structures, and eventually, everything,
including hydrogen becomes metallic. In the last
years, high-pressure research has led to several
unexpected discoveries like close to room-temperature
superconductivity in hydrogen-rich materials. While
high pressure of up to about 300 GPa can be explored
in labs on Earth, we have to move to outer space to
discover magnetic field strengths comparable to
electrostatic forces. The needed magnetic fields of
about $10^5$ Tesla can, for example, be found on
magnetic white dwarves. Here, we expect to encounter
'alien-like' ellipsoid atoms. Chemical bonds that are
very weak under normal condition like those found in
rare gas dimers become strengthened by a new binding
mechanism, the so-called paramagnetic bonding.
```

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FACULTY OF SCIENCE • TE WĀHANGA PŪTAIAO
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Seminar:

Melting in extreme environments

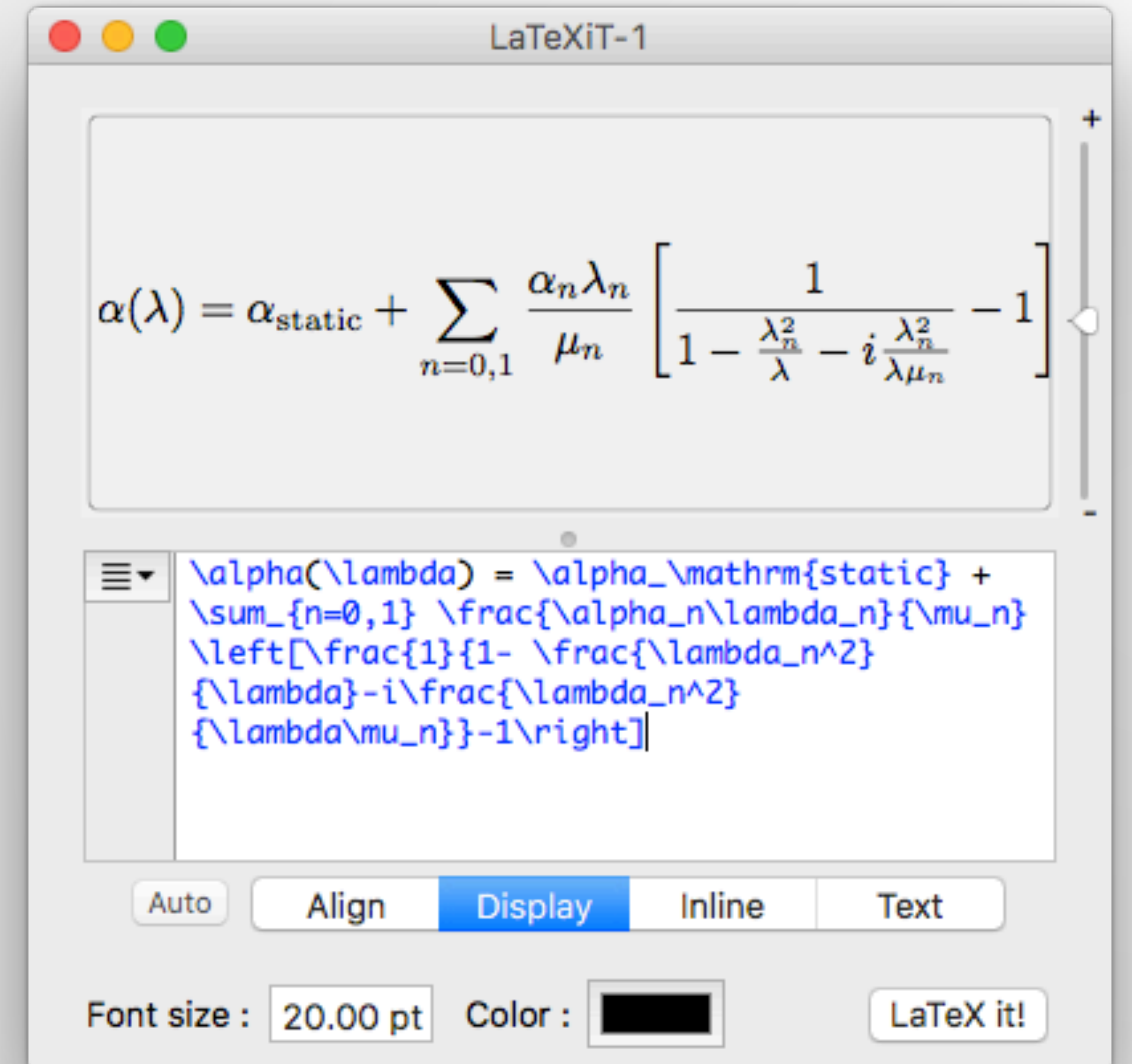
Dr Elke Pahl
Department of Physics
The University of Auckland

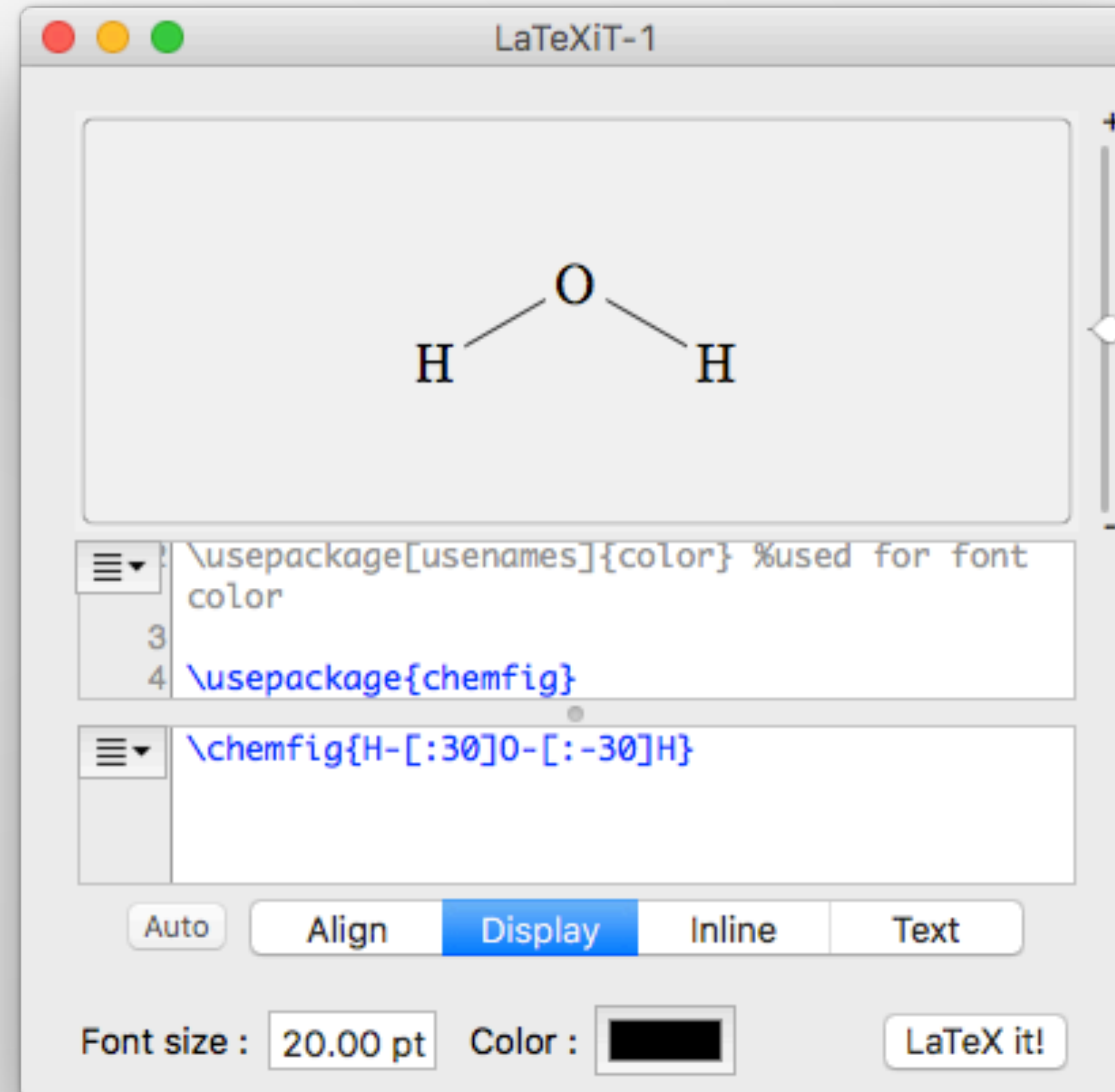
Strong magnetic fields and extremely high pressures change the properties of materials, drastically challenging our everyday intuition. Under high pressure, nature is quite inventive in finding more compact structures, and eventually, everything, including hydrogen becomes metallic. In the last years, high-pressure research has led to several unexpected discoveries like close-to-room-temperature superconductivity in hydrogen-rich materials. While high pressure of up to about 300 GPa can be explored in labs on Earth, we have to move to outer space to discover magnetic field strengths comparable to electrostatic forces. The needed magnetic fields of about 10^5 Tesla can, for example, be found on magnetic white dwarves. Here, we expect to encounter 'alien-like' ellipsoid atoms. Chemical bonds that are very weak under normal condition like those found in rare gas dimers become strengthened by a new binding mechanism, the so-called paramagnetic bonding.

In this talk, I will concentrate on the study of the melting of rare gases in such extreme conditions through the use of computer simulations. In order to simulate the melting process, we need very accurate interaction potentials and have to explore the resulting potential landscapes extensively at a range of temperatures spanning the melting transition. While we use highly accurate quantum-chemical methods for the atomic interactions, so-called parallel-tempering Monte Carlo simulations allow for an efficient sampling of phase space. After an introduction in the methodology, results of Argon melting under high pressure and Neon melting in strong magnetic fields are presented.

LBLT118
Friday 28 February, 12pm

8· OVERKILL FOR SIMPLE DOCUMENTS

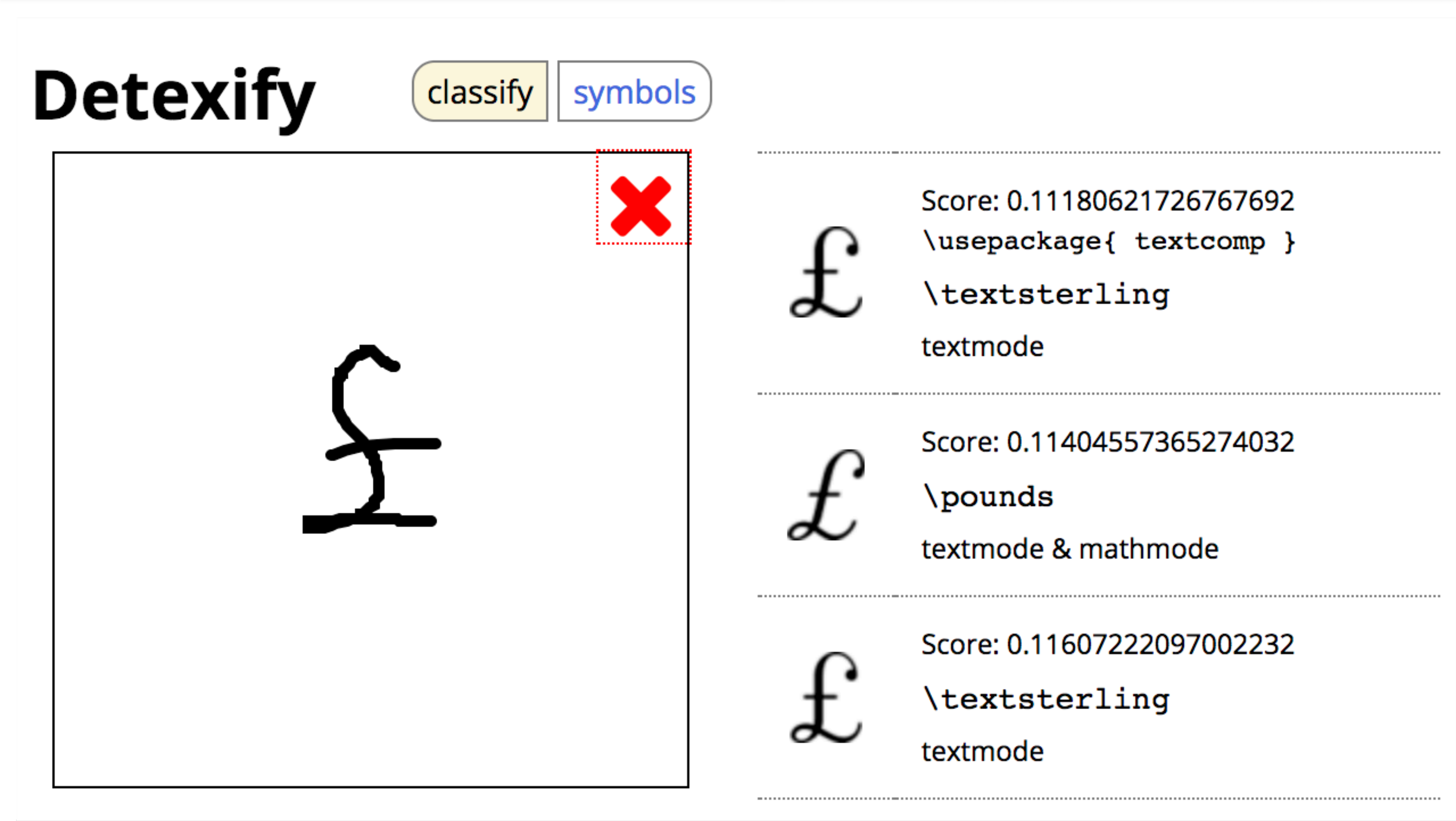





```
\documentclass{standalone}
```

9. TOO MANY COMMANDS TO REMEMBER

```
% nablabla aliases
\newcommand{\Grad}{\nabla}
\newcommand{\Div}{\nabla\cdot}
\newcommand{\Curl}{\nabla\times}
```



9. TOO MANY COMMANDS TO REMEMBER

```
## The Laplace and Poisson equations

- Combining $\Div\vecE=\rho/\eps_0$ and $\vecE=-\Grad V$,
\[
\Lapl V = -\rho/\eps_0
\]
- Solving for $V$ is equivalent to solving simultaneously $\Div\vecE=\rho/\eps_0$
and $\Curl\vecE=\vecnought$
```

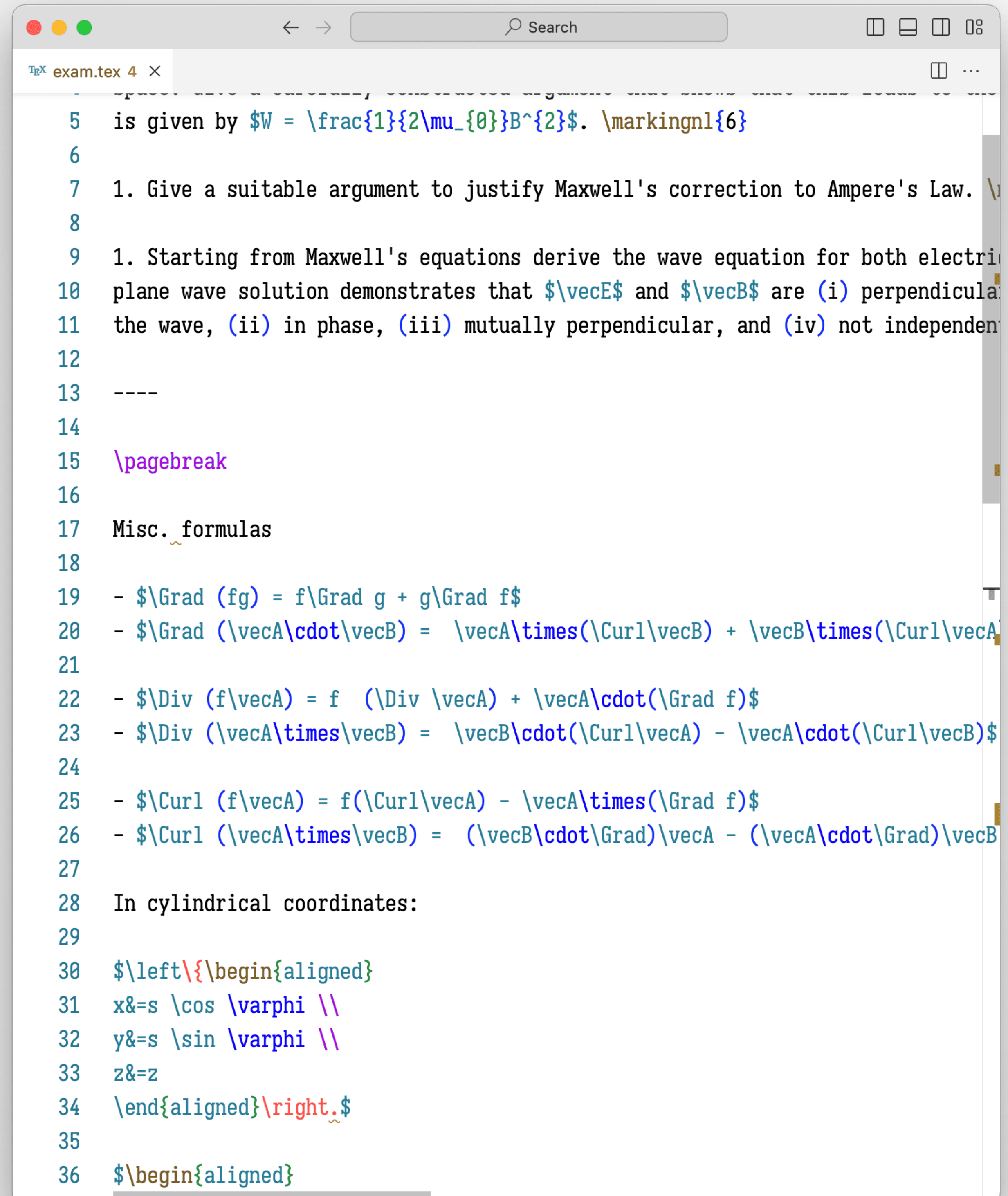
THE LAPLACE AND POISSON EQUATIONS

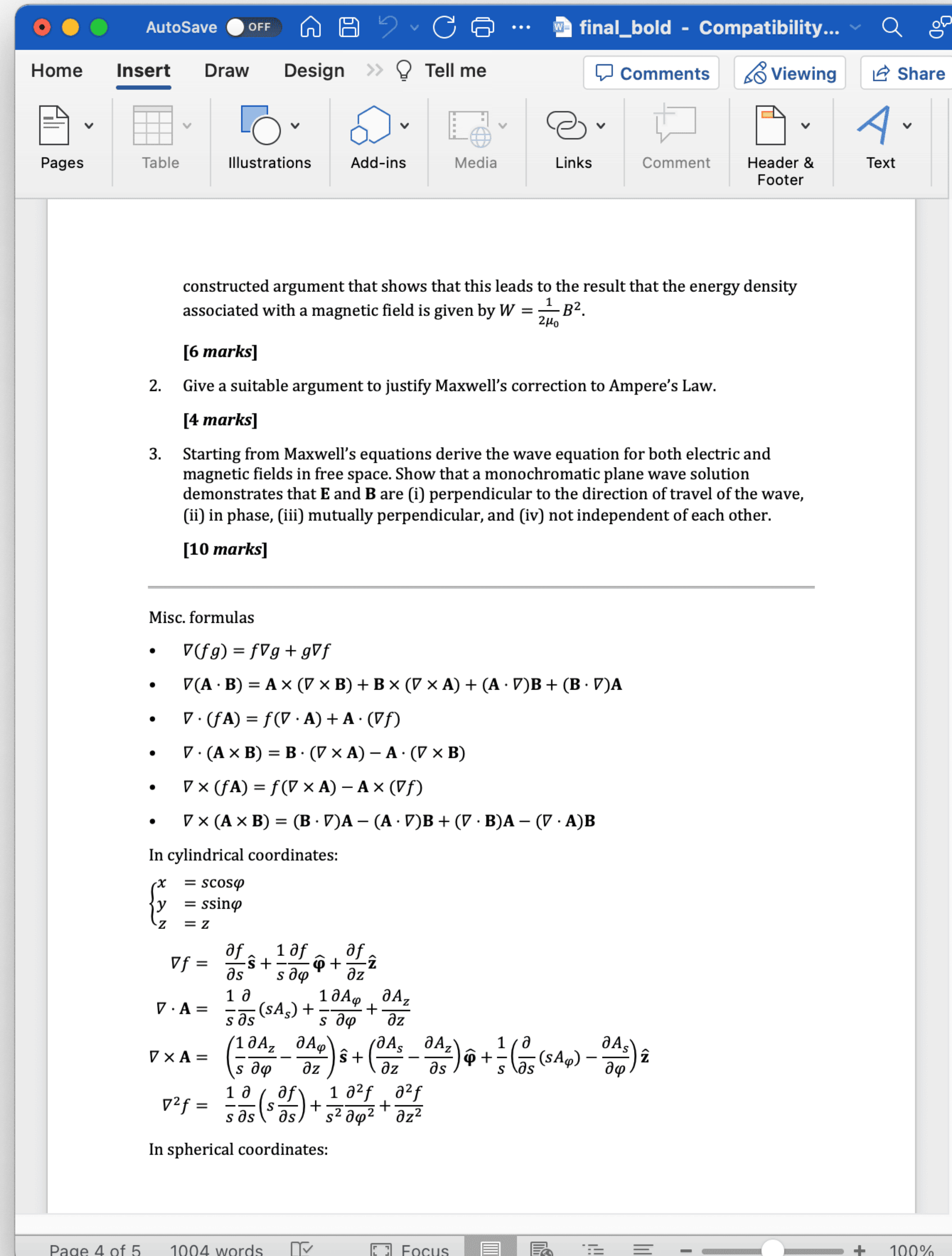
- Combining $\nabla \cdot \mathbf{E} = \rho/\varepsilon_0$ and $\mathbf{E} = -\nabla V$,

$$\nabla^2 V = -\rho/\varepsilon_0$$

- Solving for V is equivalent to solving simultaneously $\nabla \cdot \mathbf{E} = \rho/\varepsilon_0$ and $\nabla \times \mathbf{E} = \mathbf{0}$

10· COWORKERS WANT A .DOCX FILE



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pandoc exam.tex -o exam.docx
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