Ei Mel Quas Nullam Constituto, Nam Te Timeam Mentitum

A THESIS

Submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

In Some Program

UNIVERSITY OF CINCINNATI

July 2024

By

FirstName LastName

BS priorUniversity

Thesis Advisor: *Dr. Advisor*

Abstract

This provides information on how to write your MS thesis or PhD dissertation using the LaTeX document preparation system.

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Preface

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Acknowledgments

I would like to thank all those who have helped me learn, understand and appreciate this subject as well as those who helped me with LaTeX.

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Definitions

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List of Abbreviations

ACL   Access Control List

AIB   Add-In Board

ALE   Arbitrary Lagrangian Eulerian

AMANDA   Advanced Maryland Automatic Network Disk Archiver

AMBER   Assisted Model Building with Energy Replacement

AMD   Advanced Micro Devices

AMOLED   Active-Matrix Organic Light Emitting Diode

AMPI   Adaptive Message Passing Interface

ANL   Argonne National Laboratory

API   Application Program Interface

ASCII   American Standard Code for Information Interchange

ATLAS   Automatically Tuned Linear Algebra Software

b_eff   effective bandwidth Benchmark

BIOS   Basic Input/Output Operating System

BLAS   Basic Linear Algebra Subprograms

BOMD   Born-Oppenheimer Molecular Dynamics

BP   Bootstrap Protocol

CCSR   Center for Computer Systems Research

CentOS	Community enterprise Operating System
CFD	Computational Fluid Dynamics
CHARMM	Chemistry at HARvard Macromolecular Mechanics
CHAMBER	CHarmm $\leftrightarrow$ AMBER
CMake	Cross Platform Make
CODINE	Computing in Distributed Networked Environments
CP2K	Car-Parrinello 2000
CPMD	Car-Parrinello Molecular Dynamics
CPU	Central Processing Unit
CSS	Central Security Service
CTM	Chemical Transport Model
CUDA	Compute Unified Device Architecture
CUDPP	CUDA Data-Parallel Primitives Library
DAE	Differential Algebraic Equation
DARPA	Defense Advanced Research Projects Agency
DAE	Delay Differential Equation
DFT	Discrete Fourier Transform
DFT	Density Functional Theory
DGEMM	Double Precision GEneralized Matrix Multiplication
DHCP	Dynamic Host Configuration Protocol
DMCA	Digital Millennial Copyright Act

DOD   Department of Defense

DOE   Department of Energy

DRM   Distributed Resource Manager

DRMAA   Distributed Resource Manager Application API

EFF   Electron Force Field

EVL   Electronic Visualization Laboratory

FCA   Fabric Collectives Accelerator

FEA   Finite Element Analysis

FFT   Fast Fourier Transform

FFTW   Fastest Fourier Transform in the West

FLOPS   Floating Point OPerations per Second

FPU   Floating Point Unit

FSI   Fluid Structure Interaction

FTDT   Finite Difference Time Domain

FTP   File Transfer Protocol

Chapter 1

Introduction

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1.1 Section 1

At vix indoctum disputando. Eam cu doctus reprimique, quaeque democritum an eos, sit veniam facete dissentias id. Tale volumus eos te, an eum nulla tincidunt. Mea id recteque theophrastus.

Eirmod malorum vis ei. Choro euismod incorrupte in vim, ludus ornatus vis ex. Hinc wisi impedit eum no, vocent definiebas referrentur in quo. Sanctus vulputate repudiandae usu ut.

1.1.1 Subsection 1

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Docendi eligendi sit et, pri ea dicam eligendi percipitur, has soleat dolores convenire te. Sed altera placerat an, id verterem abhorreant interesset mea. Eum at ceteros efficiantur. Eos id voluptaria efficiendi comprehensam. [4]

Figure 1.1: Schematic representation of our universe

In mel modo dicam vocibus, eruditi consectetuer vim no, cu quaestio instructior eum. Justo nostrud fuisset ea mea, eam an libris repudiandae vituperatoribus. Est choro corrumpit definitionem at. Vel sint adhuc vocibus ea, illud epicuri eos no. Sea simul officiis ea, et qui veri invidunt appellantur. Vix et eros ancillae pertinax. [1, 2, 5, 6, 7]

Aliquip lobortis ei est, at error viris graeco sed. Vel te elitr detracto, modo graecis scripserit ex nec. Errem utamur viderer per no, eam ea eripuit referrentur. Pro te dicat disputando.

1.1.2 Subsection 2

Ex offendit elaboraret cum in Sec. 1.1.1, has ex natum honestatis, impedit similique ex duo. Et mei mollis scripta, et vim labores phaedrum, in cum facete saperet. Splendide elaboraret comprehensam qui ne. Putant verterem no vim, mea solum veritus definitiones ei, no labitur propriae deseruisse est. Ius illud everti salutandi id, eu facer pericula principes est.
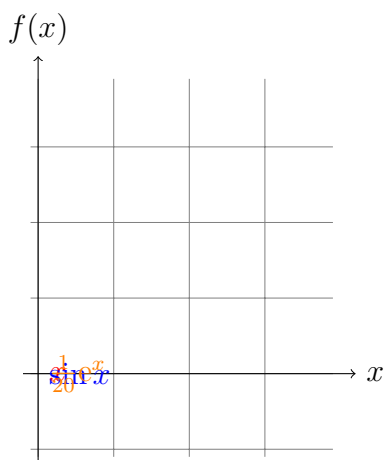
Figure 1.2: Mathematical functions plotted using TikZ package

Simul noster voluptaria eam ei, sint regione pri ei. Cum no utinam equidem, falli bonorum prodesset an qui. Alterum dissentiet vituperatoribus te eam, eos ea suas oblique. Per ea utinam facilisi. [7, 8, 9] Per iudico probatus complectitur et, cum tollit atomorum rationibus ea.

1.2 Section 2

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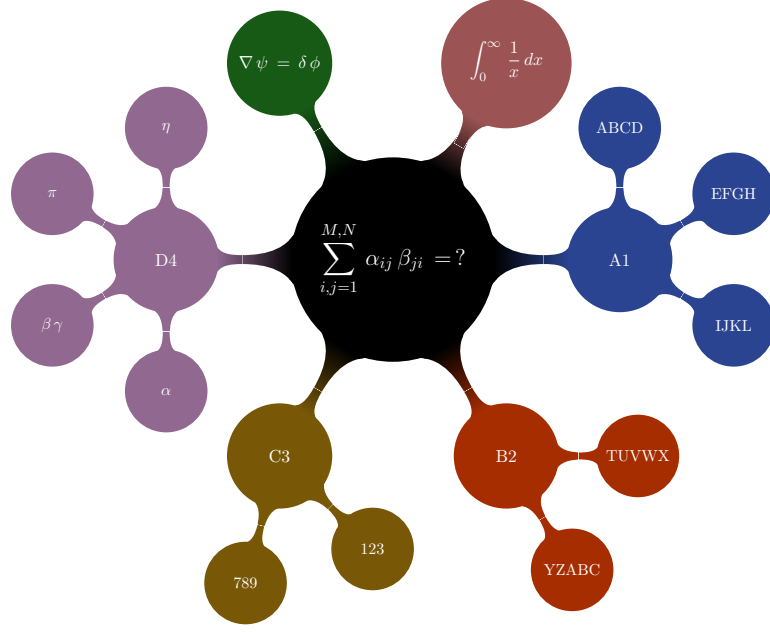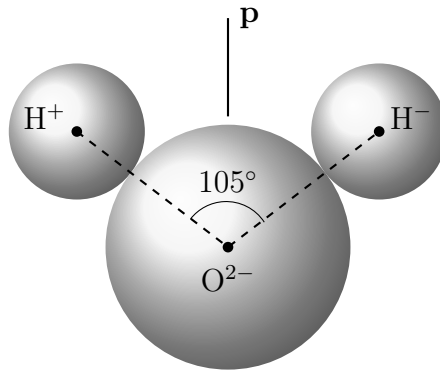

Figure 1.3: Schematic representation of a water molecule

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te dicat disputando. Per iudico probatus complectitur et, cum tollit atomorum rationibus ea. [16, 17, 18, 19]. Per iudico probatus complectitur et, cum tollit atomorum rationibus ea.

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Chapter 2

Theory and Practice

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$$d\nu \; = \; \frac{N}{V} \left(\frac{m}{2\pi \, kT}\right)^{3/2} \, e^{-mv^2/2kT} \, v^3 \, \sin\theta \, \cos\theta \, d\theta \, d\phi \, dv \qquad (2.1)$$

Eirmod malorum vis ei. Choro euismod incorrupte in vim, ludus ornatus vis ex. Hinc wisi impedit eum no, vocent definiebas referrentur in quo. Sanctus vulputate repudiandae usu ut. In prima quaeque diceret pri. Enim labores contentiones eos at, duo altera denique nominavi ea, eos inani nominavi consectetuer at.

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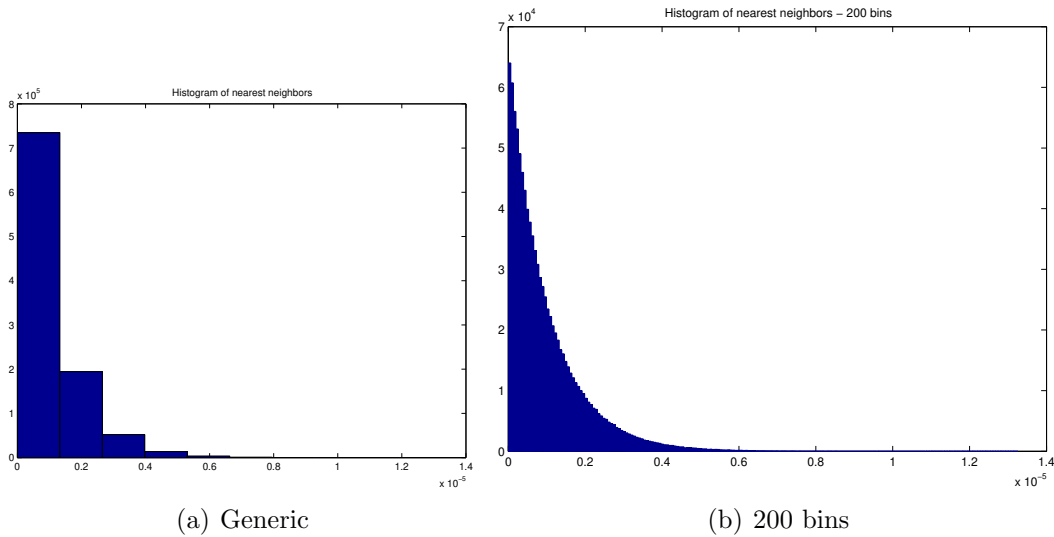(a) Generic   (b) 200 bins

Figure 2.1: Histogram of nearest neighbors

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Table 2.1
A portrait table: first column represents the year in which the Nobel prize in physics was awarded; second column indicates the name of the scientist and the third column is the work for which the Nobel prize was awareded

Year	Scientist(s)	Nobel Work
1901	W. C. Röntgen	X-rays
1902	H. A. Lorentz	Influence of magnetism on radiation
	P. Zeeman	Influence of magnetism on radiation
1903	A. H. Becquerel	Spontaneous radioactivity
	M. Curie	Radiation phenomena discovered by Becquerel
	P. Curie	Radiation phenomena discovered by Becquerel
1904	J. W. Strutt	Argon
1905	P. E. A. von Lenard	Cathode rays
1906	J. J. Thomson	Electrical conductivity of gases
1907	A. A. Michelson	Spectroscopic and metrological investigations
1908	G. Lippmann	Photographic reproduction of colours
1909	K. F. Braun	Wireless telegraphy
	G. Marconi	Wireless telegraphy
1910	J. D. van der Waals	Equation of state of gases and liquids
1911	W. Wien	Laws governing heat radiation
1912	N. G. Dalèn	Automatic regulators for lighting coastal beacons and light buoys

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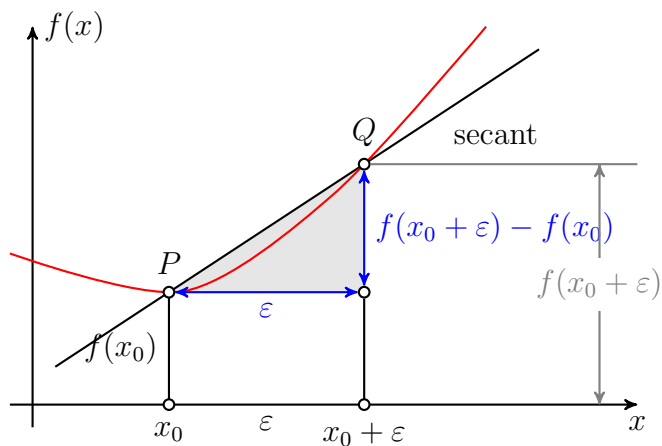
Figure 2.2: Fancy mathematical plots using TikZ package

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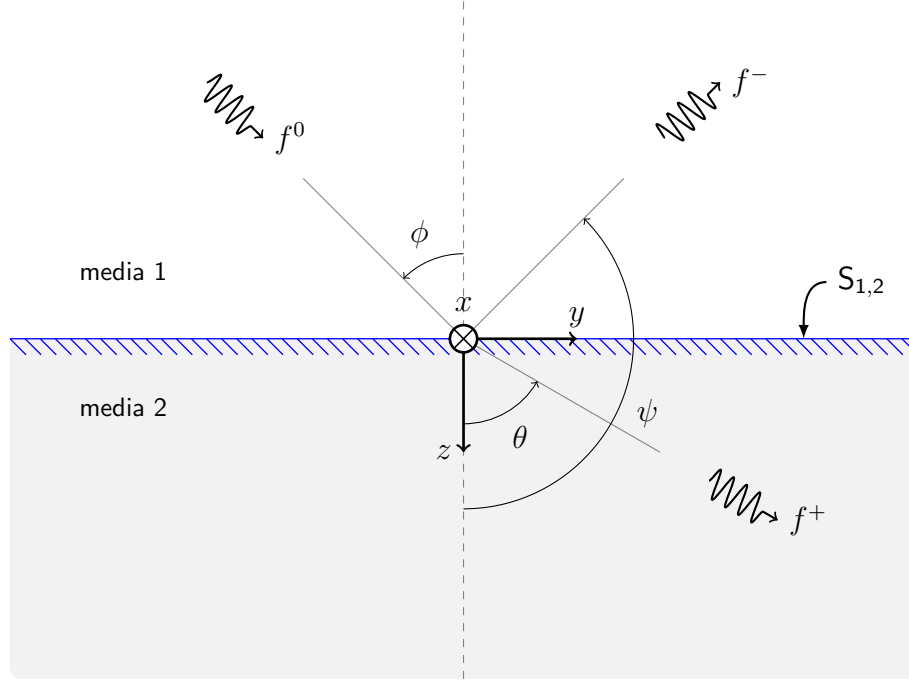

Figure 2.3: Incidence, transmission and reflection

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Chapter 3

Results and Discussion

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$$dv_\theta = \frac{N}{V} \left(\frac{m}{2\pi\,kT}\right)^{3/2} \left[\int_0^{2\pi} \int_0^\infty v^3\, e^{-mv^2/2kT}\, dv\, d\phi\right] \sin\theta\,\cos\theta\, d\theta$$

$$= 2\,\pi\,\frac{N}{V} \left(\frac{m}{2\pi\,kT}\right)^{3/2} \left[\int_0^\infty v^3\, e^{-mv^2/2kT}\, dv\right] \sin\theta\,\cos\theta\, d\theta$$

At vix indoctum disputando. Eam cu doctus reprimique, quaeque democritum an eos, sit veniam facete dissentias id. Tale volumus eos te, an eum nulla tincidunt. Mea id recteque theophrastus.

$$dv_\theta = \frac{N}{V} \left(\frac{2\,k\,T}{m\,\pi}\right)^{1/2} \sin\theta\,\cos\theta\, d\theta \tag{3.1}$$

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Sed altera placerat an, id verterem abhorreant interesset mea. Eum at ceteros efficiantur. Eos id voluptaria efficiendi comprehensam. Continuing from Eqn. (3.1)

$$d\nu_v = \frac{N}{V} \left(\frac{m}{2\pi \, kT}\right)^{3/2} \left[\int_0^{2\pi} \int_0^{\pi/2} \sin\theta \, \cos\theta \, d\theta \, d\phi\right] v^3 \, e^{-mv^2/2kT} \, dv$$

$$= 2\,\pi \, \frac{N}{V} \left(\frac{m}{2\pi \, kT}\right)^{3/2} \left[\int_0^{\pi/2} \sin\theta \, \cos\theta \, d\theta\right] v^3 \, e^{-mv^2/2kT} \, dv$$

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$$d\nu_v = \frac{N}{V} \, \pi \, \left(\frac{m}{2\pi \, kT}\right)^{3/2} v^3 \, e^{-mv^2/2kT} \, dv \tag{3.2}$$

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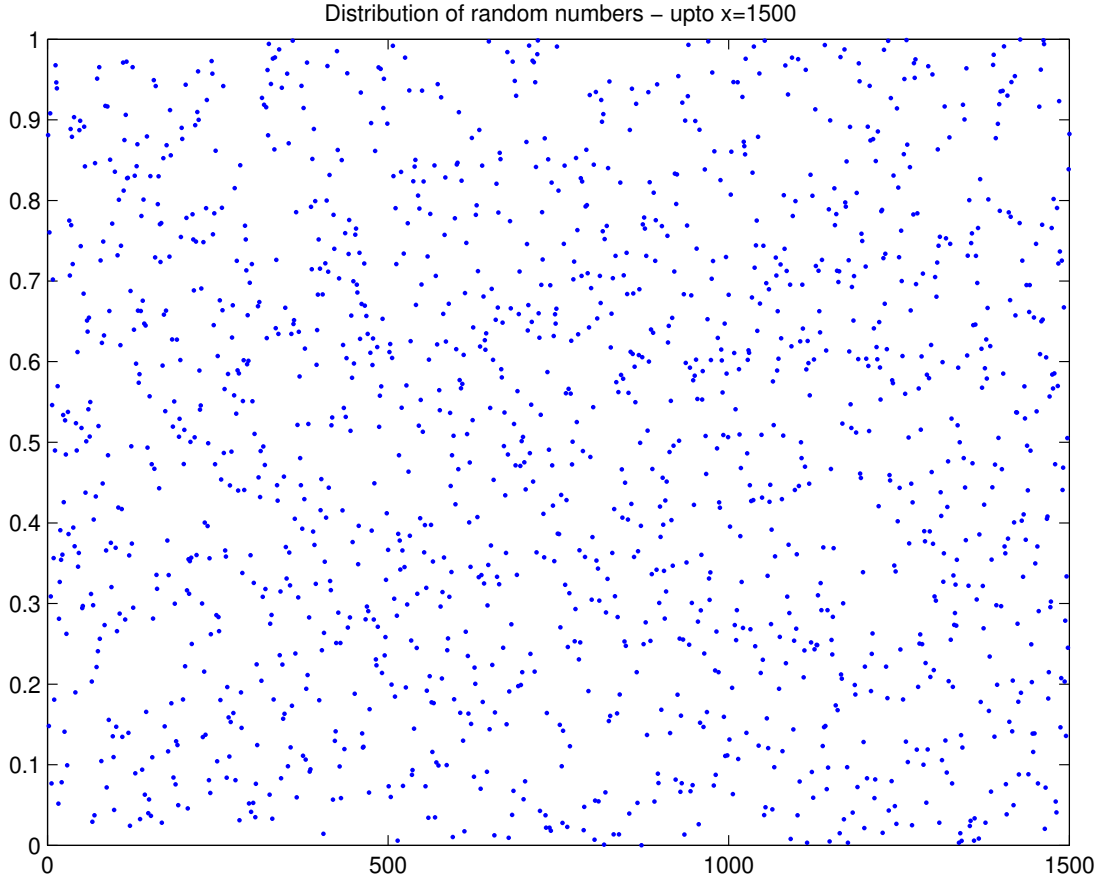
Figure 3.1: Distribution of random numbers

Table 3.1
Measured data points representing the relationship between x and y

x	0	1	2	3	4	5	6	7	8	9	10
y	0	0.94	0.99	-0.52	-1.82	-0.44	3.54	6.69	5.38	0.00	-4.42

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Table 3.2

A landscape table: first column represents the year in which the Nobel prize in physics was awarded; second column indicates the name of the scientist and the third column is an *as is* Nobel citation

Year	Scientist(s)	Nobel Work
1901	W. C. Röntgen	in recognition of the extraordinary services he has rendered by the discovery of the remarkable rays subsequently named after him
1902	H. A. Lorentz and P. Zeeman	in recognition of the extraordinary service they rendered by their researches into the influence of magnetism upon radiation phenomena
1903	A. H. Becquerel	in recognition of the extraordinary services he has rendered by his discovery of spontaneous radioactivity
	M. Curie and P. Curie	in recognition of the extraordinary services they have rendered by their joint researches on the radiation phenomena discovered by Prof. Henri Becquerel
1904	J. W. Strutt	for his investigations of the densities of the most important gases and for his discover argon in connection with these studies
1905	P. E. A. von Lenard	Cathode rays
1906	J. J. Thomson	Electrical conductivity of gases
1907	A. A. Michelson	Spectroscopic and metrological investigations
1908	G. Lippmann	Photographic reproduction of colours
1909	K. F. Braun and G. Marconi	Wireless telegraphy
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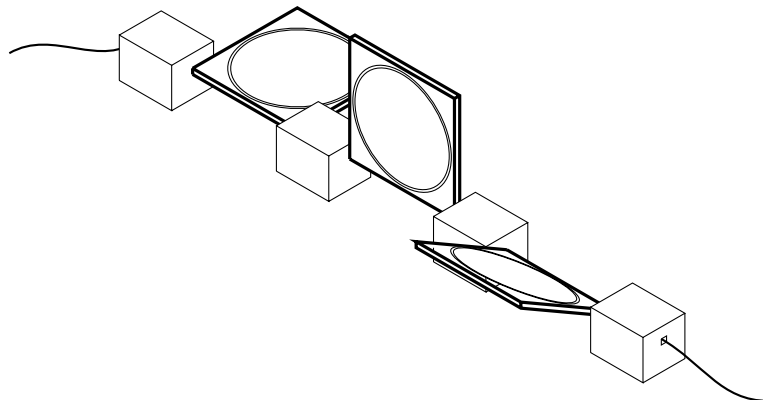

Figure 3.2: Fibre optics

Simul noster voluptaria eam ei, sint regione pri ei. Cum no utinam equidem, falli bonorum prodesset an qui. Alterum dissentiet vituperatoribus te eam, eos ea suas oblique. Per ea utinam facilisi. Docendi eligendi sit et, pri ea dicam eligendi percipitur, has soleat dolores convenire te.

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Table 3.3

A landscape table: first column represents the year in which the Nobel prize in physics was awarded; second column indicates the name of the scientist and the third column is an *as is* Nobel citation

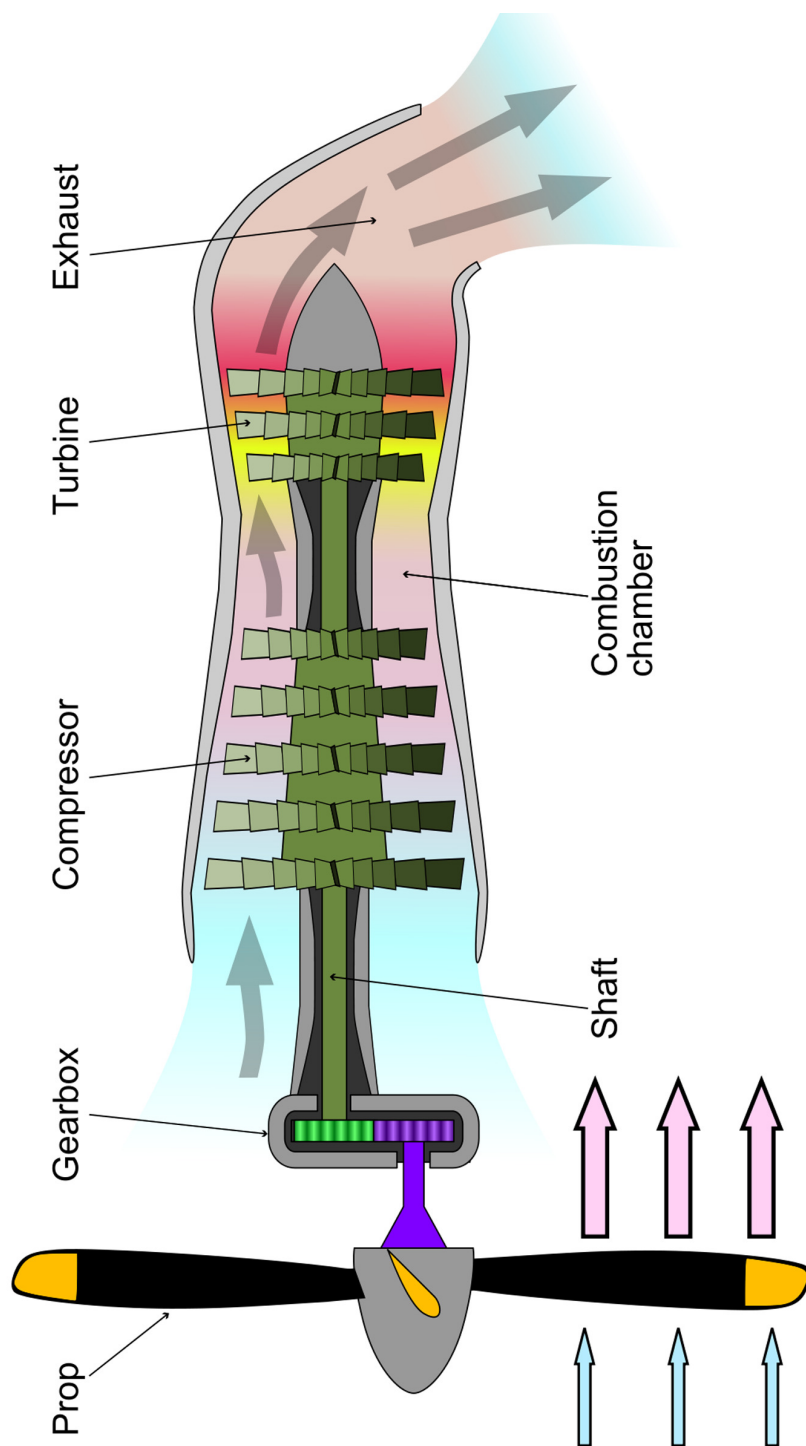| Year	Scientist(s)	Nobel Work
1901	W. C. Röntgen	in recognition of the extraordinary services he has rendered by the discovery of the remarkable rays subsequently named after him
1902	H. A. Lorentz and P. Zeeman	in recognition of the extraordinary service they rendered by their researches into the influence of magnetism upon radiation phenomena

Figure 3.3: A landscape view of a Turboprop engine - these are jet engine derivatives, still gas turbines, that extract work from the hot-exhaust jet to turn a rotating shaft, which is then used to produce thrust by some other means

Id ius soluta semper audiam, ad eos scriptorem concludaturque, id mel rebum volumus deserunt. Mel libris percipit scriptorem te, his an dicat putent menandri, mazim officiis aliquando mei no. Ne clita veniam disputando vim, postea hendrerit maiestatis qui id. Mei te suscipit quaerendum, an aliquando intellegebat ius, ei simul detraxit dissentiet eam. Zril dolor ut usu.

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Appendix A

Proof of Existence

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A.1 Section 1

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Eirmod malorum vis ei. Choro euismod incorrupte in vim, ludus ornatus vis ex. Hinc wisi impedit eum no, vocent definiebas referrentur in quo. Sanctus vulputate repudiandae usu ut.

A.2 Section 2

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In mel modo dicam vocibus, eruditi consectetuer vim no, cu quaestio instructior eum. Justo nostrud fuisset ea mea, eam an libris repudiandae vituperatoribus. Est choro corrumpit definitionem at. Vel sint adhuc vocibus ea, illud epicuri eos no. Sea simul officiis ea, et qui veri invidunt appellantur. Vix et eros ancillae pertinax.

Appendix B

Sample Code

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B.1 HelloWorld.c

```c
// HelloWorld.c
// C program to display 'Hello, World!' in the terminal.
//
// Compilation:
// gcc -g -Wall HelloWorld.c -o HelloWorld.x
//
// Execution:
// ./HelloWorld.x

// Standard headers
#include <stdio.h>

// main() begins
int main() {

  // Print the message
  printf("\n  Hello, World!\n\n");

  // Indicate the termination of main()
  return 0;
}
// main() ends
```

Appendix C

Letters of Permission

Include letters of permission from journal editors and/or other sources from which you may have used materials (images, information, etc.) in this this work.

These materials may also be submitted separately to the Graduate School as a single, well-organized PDF file.