Intermediate Lab
PHYS 3870

CONVEYING INFORMATION

Writing Reports

Gathering Information

References: PHYS 3870 Web Site

USU Library Web Site

Utah State
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Intermediate Lab
PHYS 3870

CONVEYING INFORMATION

Writing Reports

References: PHYS 3870 Web Site

Intermediate 3870

Fall 2015

WRITING REPORTS

Lecture 6   Slide 2

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PHYS 3870 Web Site

Writing page

Poster page

But first…the most important page

Physics Intermediate and Advanced Laboratories
PHYX 3870 and 3880

Intermediate Laboratory
PHYX 3870
Fall 2015

- Syllabus
- Assignment Sheet
- List of Experiments
- Experiment Schedule
- Pre-Lab Meeting Sign Ups
- Class Notes

Advanced Laboratory
PHYX 3880
Spring 2013

- Syllabus
- Extended Investigations Notes
- List of Experiments
- Experiment Schedule

Reports and Presentation

- Keeping a Notebook
- Report Writing--Class Notes (PDF) (PPT)
- Writing a Lab Report
- AIP Style Manual
- Notes on Undergraduate Research Poster Preparation
- USU Undergraduate Research Office—Great Posters
- USU Undergraduate Research Office—Great Presentations
- USU Undergraduate Research Office—Great Proposals
- Poster Presentations--Class Notes (PDF) (PPT)

Experiment Descriptions

- Brief List of Experiments
- Experiment Descriptions
- USU Experiments and the Nobel Prizes
- USU Experiments and the Physical Constants
- Equipment Manuals
- Experiment Set Up

Lab News

Tutorials

- Intermediate Lab Electronic Workbook (MCD)
  Download ZIP file, place in Mathcad "HANDBOOK" directory and unzip.
- Science Workshop--How to Begin
- Science Workshop--Analog Tutorial (Download)
- Science Workshop--Digital Tutorial
- EndNote Web Tutorial (Library)
- EndNote Web Tutorial (PDF)
- Google Scholar Tutorial (web)
- Google Scholar Tutorial (PDF)
- Data Thief Tutorial
- Download DataThief III (Site) (File)
- DataThief Example Files (JPG) (TXT) (EXLX)
- Excel Tutorial (PDF instructions) (XLS worksheet) (TXT data)
- IGOR Pro Tutorial

Related Web Sites and Resources

- Physics Home Page
- Class Syllabi Home Page
- USU Library Resource Page (PDF) (HTML)
- Instructor Home Page
- Lab Related Links
- Undergrad Research at USU
- Research Resources
- Mathcad^TM Resources

Lab Humor

- Interferometry: The Real Story
- Fabry Perot and the Interferometers
- To Kill a Lion
- Jet Powered Cooler
- More Lab Humor

General Lab References

- AAPT Goals for Physics Labs
- Annotated Bibliography
- Error Analysis Glossary

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PHYS 3870 Web Site

The Real Story

http://www.physics.usu.edu/dennison/3870-3880/Humor/science%20terminology%20humor.pdf

INTERMEDIATE LABORATORY - PHYX 3870-3800
A GUIDE TO THE TERMINOLOGY OF SCIENTIFIC PAPERS

In each couplet, the first is the phrase as it appears in the scientific literature; the second is the translation as to what it really means:

It has long been known that...
I haven't bothered to look up the original reference.

It is believed that...
I think...

It is generally believed that...
A couple of other guys think so, too.

It is not unreasonable to assume...
If you don't believe this, you might as well stop reading here.

A preliminary examination revealed...
One of my grad students pointed this out to me.

Four samples were chosen for futher study.
The others didn't make sense, so we ignored them.

Results from the third sample may be of somewhat lower confidence...
I dropped it on the floor.

...but are consistent with the data obtained from the other samples.
...but scooped most of it up.

Handled with extreme care during the entire procedure...
NOT dropped on the floor...

Typical results are shown.
The best results are shown.

Correct within an order of magnitude...
Wrong

Here comes some richly deserved character assassination.

While it has not been possible to provide definitive answers to these questions...
The experiment didn't prove anything, but at least I can publish the data somewhere.

Much additional work will be required.
The paper isn't very good, but neither is anyone else's.

Of great theoretical importance...
I got a paper out of it.

Of great practical importance as well...
I got a grant out of it, too.

These investigations proved highly rewarding...
My grant is going to be renewed.

Thanks are due to Joe Blow for laboratory assistance and to Jane Doe for many valuable discussions...
Joe did all the work, and Jane explained it to me.

A definite trend is evident...
...These data are practically meaningless.

These results will be shown in a subsequent report...
...I might get around to this if I'm pushed.

The most reliable results are those obtained by Jones.
...He was my graduate student.

It is clear that additional work will be required before complete understanding of the phenomenon occurs...
...I don't understand it.

Not inconsistent with other determinations, given our current limited understanding of this field...
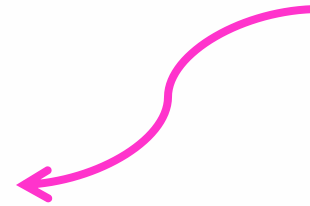*Meaningless*

The significance of these results is unclear.
Look at the pretty artifact.

It might be argued that...
I have such a devastating rebuttal to this argument that I shall now deliberately raise it.

We are unable to reconcile our results with those of Hackenbush, but...

It is hoped that this study will stimulate further investigation in this field...
...This is a lousy paper, but so are all the others on this miserable topic.

A careful analysis of the available data...
...Three pages of original notes were obliterated when I knocked over a beer.

A statistically oriented projection of the significance of the findings...
...Wild guess.

Intermediate Lab
PHYS 3870

CONVEYIMG INFORMATION

Writing Styles

References: PHYS 3870 Web Site

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Grade Rubric

Hints on Writing a Lab Report

How to Write Lab Reports	Library Reference Materials	Reference Materials
Lab Report Grade Form	USU Libraries Techniques for On-Line Journal Searches	Lab Related Links
Contents of a Lab Report	Journals Found in SER 109 • American Journal of Physics • Physics Today • Scientific American • The Physics Teacher	Annotated Bibliography Error Analysis Glossary AIP Style Manual

Last Updated 1/8/04

Notes on contents of a lab report

The AIP Style Manual

AIP Style Manual: http://www.aip.org/pubservs/style/4thed/toc.html
AIP Journals: http://www.aip.org/pubservs/compuscript.html
American Journal of Physics: http://ajp.dickinson.edu/Contributors/manFormat.html

Intermediate Laboratory – PHX 3870

Laboratory Report Evaluation

PHYS 3870 Report Rubric
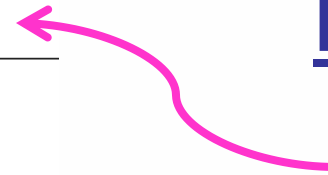
Grade Rubric

Author: _____   Date: _____

Partner: _____   Grade: _____

Experiment: _____   Format: Full / Brief / Notebook

General Comments:

http://www.physics.usu.edu/dennison/3870-3880/References/Lab_Report_Rubric.pdf

Comments on Science:

Comments on Writing:

Other Comments:

A LAB REPORT SHOULD:

____ Identify the problem (system) to be studied.

____ Identify the input(s) and outputs(s) to be studied.

____ Describe the approach to use outputs to tell how the inputs affect the system and its outputs.
____ Propose a model to test.

____ Describe the results of your observations.

____ Describe the quality of the observations.

____ Determine the effectiveness of your model.

____ Discuss generalization of the model.

PHYS 3870 Report Rubric

CONTENT OF A LAB REPORT

Title page:
_____ Title of lab
_____ Experimenter's and partner's names
_____ Class name and number
_____ Date of completion of experiment and report

Introduction:
_____ Statement of purpose - What do you plan to accomplish? Why is the lab interesting or important?
_____ What are the important physical principles explored in the experiment?

Theory:
_____ Any appropriate scientific or historical background
_____ Any appropriate discussions of theory
_____ Any appropriate derivation of equations*

Procedures:
_____ List of apparatus*
_____ Diagram of experimental setup*
_____ Details of procedures you used; what was done and how it was done. Emphasize procedures different from those outlined in manual

Results:
_____ List of data* (Tabular or graphical format is best)
_____ Methods of analysis including sample calculations
_____ Discussion of error analysis

Discussion and Conclusions:
_____ Summary of results
_____ Summary of error analysis
_____ Significance of results - how does this verify the basic physical principles
_____ Summary of what you learned
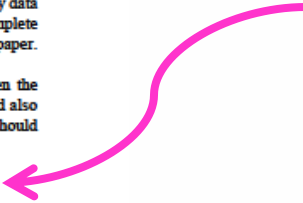
_____
*May be appropriate to put these items in an appendix.

E-Excellent   V-Very Good   G-Good   N-Needs Work   X-Absent or Inadequate   √-Satisfactory

Grade Rubric

http://www.physics.usu.edu/dennison/3870-3880/References/Lab_Report_Rubric.pdf

Intermediate 3870
Fall 2015
WRITING REPORTS
Lecture 6   Slide 8

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PHYS 3870 Web Site
Content of a Lab Report

Notes on contents of a lab report

http://www.physics.usu.edu/dennison/3870-3880/References/Content%20of%20Lab%20Report.pdf

INTERMEDIATE LABORATORY - PHYX 3870-3880
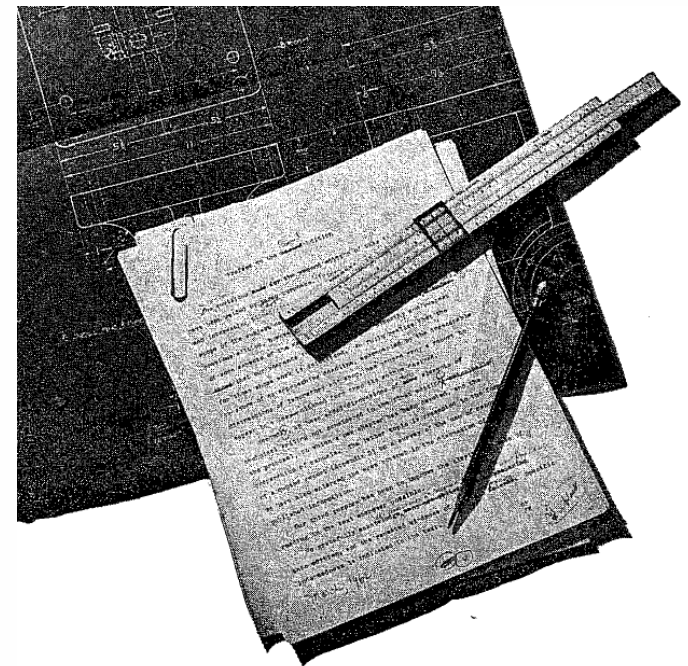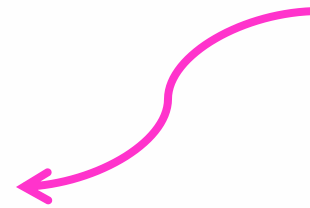### Content of Lab Reports

NOTES ABOUT USE OF A LAB NOTEBOOK

- For these experiments which are graded solely on the notebook, you should be sure to complete all calculations and error analysis. You should also enter some summation and conclusions concerning your results. The presentation need not be polished, but the indications of your understanding must be there. Notebooks will be graded on the completeness of the data, correctness and clarity of the data and error analysis, and an understanding of physical concepts as conveyed in concluding remarks. The notebook need not be pristine; however, you should be neat, organized, and complete enough to be able to reconstruct your experimental results at some later data. *In addition, you should take mercy on your instructor and make the notebook coherent and legible enough that he has some hope of grading your work.*

- Use of your lab notebook is intended to help you develop good habits in the laboratory and help you organize your thoughts. Record all your data and comments directly into your notebook. It is permissible for you to photocopy data from your partner's notebook to avoid having to take duplicate notes, but each notebook should contain a complete record of all data taken. All material should be permanently attached in your notebook; there should be no loose paper.

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NOTES ABOUT WRITTEN LAB REPORTS:

- Write your lab reports with next year's students as your audience. Your report, together with the lab write-up, should provide these students with all the information necessary to perform the lab, analyze the data, and evaluate their results. In addition, your report should highlight the interesting aspects and physical principles of the lab topic.

- SI units should be used except under special circumstances.

- All measured quantities and those derived quantities included in the conclusions must quote an uncertainty (which has been justified in the text) and have units listed. **Pay attention to significant figures.**

- Data should be recorded in a lab notebook.

- You are encouraged to perform the experiments in pairs; however, lab reports should be written independently. It is a good idea to have your partner critique your report before it is submitted for grading.

- Grading of the written reports is based on the following:
  - Understanding of concepts conveyed in lab report
  - Data and error analysis procedures in lab report
  - Clarity and correctness of conclusions drawn on the basis of your data and analysis
  - Presentation of information (including spelling, grammar, and style) in lab report

- Formal written reports have no length limit, but are typically 7 to 10 typed pages. Not all experiments are appropriate for a written report; check with the instructor.

- Brief reports are limited to two typed pages including all data, figures, tables, and references. The emphasis is to convey the important points of the experiment in a concise manner. A typical brief report might contain one or two paragraphs for each of the sections listed above. Emphasis must be placed on the important physics and your results.

PHYX 3870-3880: Physics Intermediate Laboratory   - 1 -   Content of Lab Reports

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TECHNICAL WRITING *Revised Edition*

GORDON H. MILLS · *The University of Texas*

JOHN A. WALTER · *The University of Texas*

Notes on "Old School" Technical Writing

"The Scientific Attitude"

HOLT, RINEHART AND WINSTON
New York · Chicago · San Francisco
Toronto · London

HOW TO
Write and Publish
a Scientific Paper

ROBERT A. DAY

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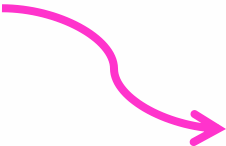
Notes on "Old School" Technical Writing

Tense in Scientific Writing
Active Vs Passive Voice
Singulars and Plurals

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Intermediate 3870
Fall 2015

WRITING REPORTS

Lecture 6   Slide 13

Technical Writing

Notes on Technical Writing

Engineers and scientists perform many complex and intricate tasks using the world's most sophisticated equipment. However, their performance as engineers and scientists is almost always related to their use of one of the oldest tools - the pen. In academia, the saying "publish or perish" often describes the process of acquiring tenure as well as credibility. In industry, both large and small organizations communicate everything through memos, reports, and short presentations. Product development decisions are often made by a committee of people far removed from the actual technology. The saying "he who has the most convincing viewgraphs and reports, wins..." can sometimes apply to industry. Therefore, it should be clear that an ability to concisely and efficiently prepare technical reports, research papers, and or viewgraph presentations can have a profound positive impact on an individual's career. Consider the following statement by anonymous Fortune 500 corporate vice president:

"... in any large organization, the person who decides whether you get a promotion, or who determines the size of a pay raise, does not know you personally. The only thing they have to go on is what other people write about you and what you write about you ..."

It can be seen that if one should write a lot of material to get ahead in one's career, it makes sense to write as objectively and concisely as possible. Objective writing is essential because good technical writing should not be seen as erroneous after new discoveries are made. A good technical report should present a clear milestone of what was done and understood at the time of the writing. Speculation about future research, or what might have gone wrong with the experiment or research, is acceptable so long as it is clearly labeled as speculation, rather than observation or fact. Objective reporting should be detailed enough to allow a technical peer to reproduce the experiment or research without difficulty. However, concise writing is also essential because everyone is short or time.

Every handbook on technical writing will emphasize the importance of knowing the audience to gauge the depth of details to present. It is also important to decide whether the report is for

PHYS 3870 Web Site

Wheeler's Rules of Writing

Wheeler's rules of writing

(These rules were assembled over several years by Edwin F. Taylor, one of many collaborators with John Archibald Wheeler (JAW). JAW has read these and generally approved them, but he has not edited them.)

Motivate! Motivate! Motivate! The text should read like a detective story, keeping the reader on the edge of her chair, gasping for the next handout. Every sentence quotable! Book design must contribute to the rich, headlong plunge.

Simplify! Simplify! Simplify! JAW: "Everything important is, at bottom, utterly simple." Einstein: "I want to know His [God's] thoughts, the rest are details."

The power and generality of the singular, the specific, the committed: Avoid plurals. "those designing Earth satellites" becomes "anyone designing an earth satellite." Use *the* rather than *a*: "Center of the black hole," not "center of a black hole." No "if," no "suppose," instead, use "when."

The power of the present: Avoid past tense unless talking about history. Avoid unnecessary future tense.

The power of the active: Avoid passives.

The dullness of simply being: Suppress the use of the verb "to be."
JAW: "Whenever I have an 'is' in a sentence, I know there is something wrong with that sentence."
"…is not an harmonic oscillator" becomes "…does not rate as an harmonic oscillator."
"He is happy" becomes "He beams happiness."
"Schwarzschild spacetime geometry is distinguished from all other conceivable geometrics…" becomes "Schwarzschild spacetime geometry distinguishes itself from all other conceivable geometries…."

Avoid the subjunctive ("We would like to express the metric as…") except in cases in which you are presenting something with which you do not agree ("Some would conclude incorrectly that…").

Avoid "ing" words. "before escaping or plunging" becomes "before it escapes or plunges"; "The Earth is rotating" becomes "The Earth rotates."

Put the key word first or early in the sentence or at the end of the sentence, not in the middle.

Rhetorical rule of threes. Use three descriptions to establish a triangle that spans the idea being presented: "proper time, interval, wristwatch time" or "Schwarzschild radial coordinate, *r*, reduced circumference." It is also a reminder of the different descriptors of the same thing.

Use "we" to include the student, rather than "you," which is not so friendly: "As we plunge into a black hole…."

However….

Use infinitive construction: "To find", "to learn", "to determine" rather than "we do so and so" or "let us do so and so," which is condescending because the author is going to do it anyway.

"We use the Principle of Relativity to derive the invariance of the interval." or "Let us use the Principle of Relativity to derive the invariance of the interval." or "Use the Principle of Relativity to derive the invariance of the interval." all become "To derive the invariance of the interval, use the Principle of Relativity."

Use commands to stir the blood—but sparingly.
"Find…"
"Determine…"
"Reckon…" (rather than "compute" or "calculate," which seem technical)
"Plunge…"
But not so much as to seem bossy.

Appeal to experiment or logic—not to the professions. Do not invoke "scientists" to enforce a point.

John A. Wheeler
Department of Physics
Princeton University
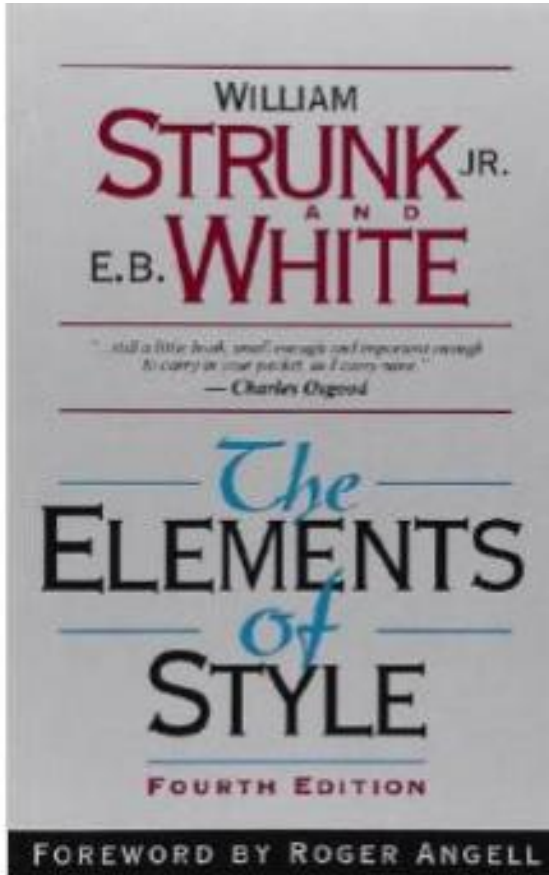
Review
"...a marvellous and timeless little book... Here, succinctly, elegantly and without fuss are the essentials of writing clear, correct English."
John Clare, "The Telegraph"

From the Back Cover
Some acclaim for previous editions:

"Buy it, study it, enjoy it. It's as timeless as a book can be in our age of volubility."
— The New York Times

"No book in shorter space, with fewer words, will help any writer more than this persistent little volume."
— The Boston Globe

"White is one of the best stylists and most lucid minds in this country. What he says and his way of saying it are equally rewarding."
— The Wall Street Journal

"The book remains a nonpareil: direct, correct, and delightful."
— The New Yorker

Utah State University

Science

Writing

Center

Located in the STE²M Center

Need help with lab reports or scientific research papers?

Visit us on the second floor of the Edith Bowen Lab School.
Make sure you come in through the entrance off 700 East.

We're open Monday-Thursday, 5:00-7:00.
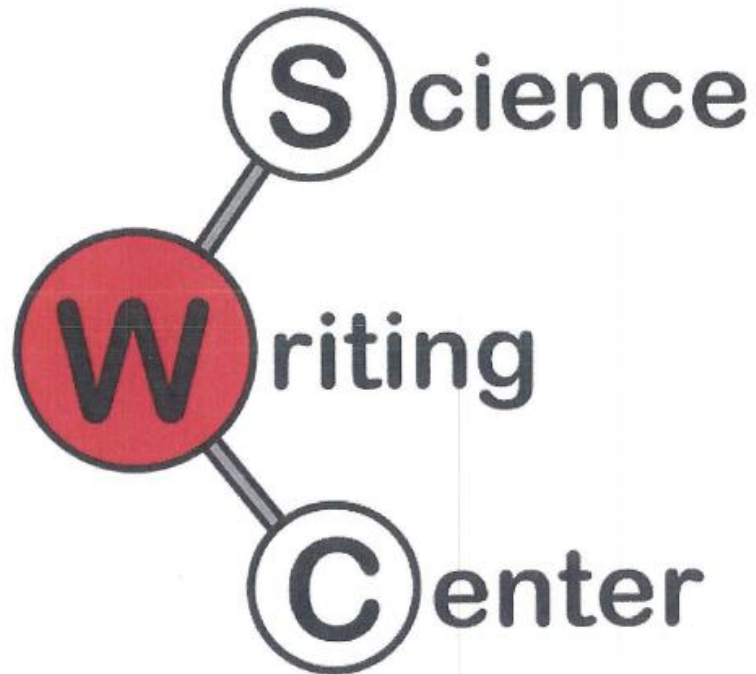
PHYS 3870 Web Site
A New Writing Resource

Style Manuals

Grade Rubric

Notes on contents of a lab report

The AIP Style Manual

Hints on Writing a Lab Report

How to Write Lab Reports	Library Reference Materials	Reference Materials
Lab Report Grade Form	USU Libraries Techniques for On-Line Journal Searches	Lab Related Links
Contents of a Lab Report	Journals Found in SER 109 • American Journal of Physics • Physics Today • Scientific American • The Physics Teacher	Annotated Bibliography Error Analysis Glossary AIP Style Manual

Last Updated 1/8/04

AIP Style Manual: http://www.aip.org/pubservs/style/4thed/toc.html
AIP Journals: http://www.aip.org/pubservs/compuscript.html
American Journal of Physics: http://ajp.dickinson.edu/Contributors/manFormat.html

Intermediate Lab

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CONVEYIMG INFORMATION

Journal Style Manuals

References: PHYS 3870 Web Site

AJP web site http://ajp.dickinson.edu/Contributors/contGenInfo.html

AIP Style Manual: http://www.aip.org/pubservs/style/4thed/toc.html

American Journal of Physics Style

Audience and Mission

The mission of the American Journal of Physics (AJP) is to publish articles on the educational and cultural aspects of physics that are useful, interesting, and accessible to a diverse audience of physics students, educators, and researchers who are generally reading outside their specialties to broaden their understanding of physics and to expand and enhance their pedagogical toolkits at the undergraduate and graduate levels.

AJP web site

http://ajp.dickinson.edu/Contributors/contGenInfo.html

AIP Style Manual

Includes information on:

- **Writing a paper**
- **Parts of a paper**
- **Headings**
- **Reference formats**
- **Grammar and punctuation**
- **Spelling and misspelled words**
- **"I" and "we"**
- **Capitalizations**
- **Accepted abbreviations**
- **Symbols**
- **Units**
- **Graph formats**
- **Figures and figure captions**
- **Tables and Table captions**
- **Equations**
- **Symbols**
-

AIP Style Manual: http://www.aip.org/pubservs/style/4thed/toc.html

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Intermediate Lab
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CONVEYING INFORMATION

Gathering Information

References: PHYS 3870 Web Site

USU Library

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Access the USU Library Home Web Page

http://library2.usu.edu/howto/

Access the USU Library How-Tos

Quick How-Tos

http://library2.usu.edu/howto/

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UNIVERSITY LIBRARIES

USU home   A-Z index   calendars   MyUSU   contact   directory

| Library Catalog | Library Hours | Articles and Databases | Study Rooms | Contact Library |

QUICK HOW TO GUIDES

do-it-yourself help guides

Table of Contents

Ask a Librarian

I need help with **articles**

I need help with **books**

I need help with **websites**

I'm **looking** for **a specific item**...

How do I **cite & organize sources**?

I need help writing a **research paper**

I'm **not at the Logan** Campus

I'm having problems **accessing material**

USU Merrill-Cazier Library • 3000 Old Main Hill • Logan UT 84322-3000 • 435-797-2633

http://library2.usu.edu/howto/sitemap.php

- **I need help with articles**
  - How do I get to the full article?
  - How do I find journal & magazine articles?
    - Finding a specific article in print
    - Finding newspaper & magazine articles
    - What kind of article am I looking at?
    - Can I browse e-journals?
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  - Evaluating articles
  - Finding specific articles
  - You don't have my article
  - Finding articles in the BARN
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- **I need help with websites**
- **I'm looking for a specific item...**
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  - I'm looking for a book.
  - I'm looking for an article.
  - Getting to the full article
  - Do you have my texbook?
  - I'm looking for a dissertation or thesis
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  - I'm looking for books
- **How do I cite & organize sources?**
- **I need help writing a research paper**
  - Sources and your assignment
  - My topic is too narrow - how can I broaden it?
  - My topic is too broad - how can I narrow it?
  - I can't find enough on my topic
  - I need help integrating sources into my paper
  - I need help getting started & choosing a topic
    - Finding relevant things
    - Getting ideas and brainstorming
    - Reading for ideas
    - Is this a good topic?
  - Writing Center help
- **I'm not at the Logan Campus**
- **I'm having problems accessing material**

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Intermediate 3870
Fall 2015

WRITING REPORTS

Lecture 6   Slide 24

Access the USU Library Home Web Page

USU Library / LibGuides / PHYS 2500 and 3870/3880 / Information Resources In Physics

PHYS 2500 and 3870/3880: Information Resources In Physics

Information Resources for Physics 2500 [PHYS|2500/3870/3880]

Information Resources In Physics	Journals	Databases	Citing Your Sources	Finding the Information

The Basics

Part of your work in this class will require you to search the physics literature to identify journal articles that support work you are doing in your labs or other assignments. The "Databases" tab lists good sites for you to use to find journal articles. The "Journals" tab lists information about journals in the Merrill-Cazier Library.

You will be expected to read and cite peer reviewed articles. The authors of these articles submitted their work to be read and critiqued by other experts in the field prior to being accepted for publication in a journal. This is done to insure the published work is reliable and sound.

Sometimes it is not easy to tell if a journal publishes peer-reviewed articles. You can use the table below to help determine if the article is from a peer-reviewed journal. Alternatively, you can always contact your friendly librarian (email the article or citation to the address in this guide) and they can usually tell you very quickly if it is a peer review journal.

One common measure of the reputation and utility of various peer reviewed journals is the impact factor. This is based on the average number of times articles from a given journal are cited by other authors.

Scholarly vs. Popular

	Scholarly	Popular
Bibliography	yes	usually none present
Author	noted expert or professional and credentials are provided	journalist, student, or no name provided
Reading Level	advanced, often with specialized vocabulary or jargon	easy to read
Purpose	to provide information in a specific field and/or report research findings	provides an overview, opinions, or general information
Article submission	articles are reviewed by professional peers; editor and editorial staff are experts in the field and may work at a variety of institutions	articles are written by staff of the magazine or newspaper; editor and editorial staff work for the magazine/newspaper
Article format	structured with sections such as abstract, introduction, methods, results, and discussion	articles do not necessarily follow a set structure or format

Subject Guide

Betty Rozum

Email Me

Subjects:
Physics

Last Updated: Jul 13, 2015 6:04 PM | URL: http://libguides.usu.edu/physics2500 | 🖶 Print Page

Login to LibApps

Setting Up Google Search at USU

Good information on electronic journals, Endnote and Google Scholar http://libguides.usu.edu/c.php?g=52461&p=338450

Databases

- Google Scholar

Google Scholar searches very broadly across the literature, but if you utilize the advanced search features you can hone your search nicely. Google Scholar offers a "cited by" feature, similar to what Web of Science does, but the two cannot be compared side by side due to differences in indexing practices.

- Web of Science

The Web of Science contains three citation indexes that are searched simulatneously: Science, Social Sciences, and Arts & Humanities. The Science Citation Index indexes only 6,650 journals, but only those journals considered to be the top journals are included. The greatest strength of the database is that it includes cited references and it allows you to perform cited reference searching. For example, you can identify authors who have cited a particular paper. Coverage goes back to 1975.

USU set up instructions:
http://libguides.usu.edu/c.php?g=52461&p=338450

Google Scholar Home Page:
http://scholar.google.com

Settings in Google Scholar for USU Resources

1. Open **Google Scholar**.
2. Click the **Scholar Preferences** link.

3. Scroll down the resulting page to **Library Links**.

Library Links (what's this?)   Utah State University   Find Library
e.g., *Harvard*

4. Type **Utah State University** and click **Find Library**.
5. Check to make sure that "Utah State University - Full-Text @ Utah State" appears and the box is checked.

Show library access links for (choose up to three libraries):
- ☑ Utah State University - Full-Text @ Utah State
- ☑ Open WorldCat - Library Search
- ☑ Utah State University - Full Text@IngentaConnect
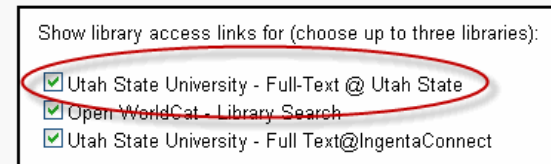
6. After you run a search, on your results page you should see a link titled Full Text @ USU to the right of any articles for which the USU libraries have an electronic subscription. Clicking this link will take you a page with links to the full text and the option to enter your A number and banner password to gain access to the article from off-campus.

sagepub.com [PDF]
Full-Text @ Utah State

Please contact a librarian if you have any questions.

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Searching with Google Scholar

Google Scholar Home Page:
http://scholar.google.com
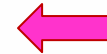
Search Criteria

1. **Select words**
2. **Select authors**
3. **Select journal**
4. **Select date**
5. **Select fields**

Articles from Google Scholar

Getting the Article

allintitle: chamber radiation OR chamber OR test "space survivability" -spect

1 result (0.07 sec)

Small-Scale Simulation **Chamber** for Space Environment Survivability Testin
RH Johnson, LD Montierth, JR Dennison... - Plasma Science, ..., 2013 - ieeexplore.ieee.org
... The SST **chamber** can also be Fig. ... reconfigured as a **radiation** source for other **test** chamber
by removing the same sample stage flange and bolting the upper source components to
other SDL and USU **test** chambers using the lower 36-cm flange. ...
Cited by 2   Related articles   All 7 versions   Import into EndNote   Save   More

✉ Create alert

[PDF] from usu.edu
Full-Text @ Utah State

Access article

About Google Scholar   Privacy   Terms   Provide feedback

Access Journal

IEEE TRANSACTIONS ON PLASMA SCIENCE, VOL. 41, NO. 12, DECEMBER 2013   3453

Small-Scale Simulation Chamber for Space Environment Survivability Testing

Robert H. Johnson, Lisa D. Montierth, J. R. Dennison, James S. Dyer, and Ethan R. Lindstrom

Abstract—A vacuum chamber was designed that simulates the space environment to facilitate tests of material modification due to space environment interactions. Critical environmental elements to be simulated include an ultrahigh vacuum, a far ultraviolet (FUV)/ultraviolet/VIS/NIR solar spectrum, an electron plasma flux, temperature extremes, and long duration exposure. To simulate the solar electromagnetic spectrum (EMS), a solar simulator was used with a range 200–2000 nm. Krypton lamp altogether. For example, changes in reflectivity and emissivity of surface materials due to exposure to ultraviolet (UV) radiation [1], temperature fluctuation [2], charged particle flux [3], contamination [4]–[6], or surface modifications [7] can lead to changes in optical, thermal, and charging properties of the materials. Alternately, exposure to higher fluence radiation can generate atomic scale defects in materials leading to changes in

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Digital Library   UtahState University MERRILL-CAZIER LIBRARY   Access provided by: Utah State University » Sign Out   ◆IEEE

BROWSE ▾   MY SETTINGS ▾   GET HELP ▾   WHAT CAN I ACCESS ▾

Enter Search Term   🔍 Search

Basic Search   Author Search   Publication Search   Advanced Search   Other Search Options ▾

Browse Journals & Magazines > Plasma Science, IEEE Transact ...> Volume:41 Issue:12 ⓘ

Small-Scale Simulation Chamber for Space Environment Survivability Testing

📄 Full Text as PDF

📄 Full Text in HTML

5
Author(s)   Johnson, R.H. ; Phys. Dept., Utah State Univ., Logan, UT, USA ; Montierth, L.D. ; Dennison, J.R. ; Dyer, J.S.
more authors

Article as PDF

Abstract   Authors   References   Cited By   Keywords   Metrics   Similar

⬇ Download Citations
✉ Email

A vacuum chamber was designed that simulates the space environment to facilitate tests of material modification due to space environment interactions. Critical environmental elements to be simulated include an ultrahigh vacuum, a far ultraviolet (FUV)/ultraviolet/VIS/NIR solar spectrum, an electron plasma flux, temperature extremes, and long duration exposure. To simulate the solar electromagnetic

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An Exercise in Reference Management and Use

Use Google Scholar to find:

- A physics related article by an author with your last name
- An article in American Journal of Physics related to this topic
- An article from within the last 2 years related to this topic
- An article from before you were born related to this topic

(See additional parts to this Exercise related to EndNote Web below)

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CONVEYING INFORMATION

Gathering Information

References: PHYS 3870 Web Site

USU Library

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Introduction to EndNote and EndNote Basic

EndNote is a software program that program that stores and organizes citations, and enables you to import citations directly into a Word document.

Endnote Basic is a version of this freely accessible to USU students, with almost all of the functionality of the main program.

Create Citation Library

Stores and organizes figures and equations

Can link papers to citations.

Can search bibliographic databases

Tutorials

http://www.endnote.com/training/

http://libguides.usu.edu/usingendnoteweb

Log On

http://www.endnoteweb.com/

Easy bibliography

http://endnote.com/training/WMVs/ENX2/enx2tutorial_download.asp

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WRITING REPORTS

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Importing Articles from Google Scholar to EndNote Basic

Import into Endnote
Import to RefMan

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WRITING REPORTS

Lecture 6   Slide 33

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Importing Articles from Google Scholar to EndNote Web

Set up Goggle Scholar to Work with EndNote Web.

Import into Endnote
Import to RefMan

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WRITING REPORTS

Lecture 6   Slide 34

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Importing Articles from Google Scholar to EndNote Web

Saving with Goggle Scholar

Google

Scholar Settings

Search results
Languages
Library links
Account
Button

Collections

- Search articles (☑ include patents).
- Search case law.

Results per page

10 ↕ Google's default (10 results) provides the fastest results.

Where results open

☐ Open each selected result in a new browser window.

Bibliography manager

- Don't show any citation import links.
- Show links to import citations into

BibTeX
EndNote
RefMan
RefWorks

Save   Cancel

To retain settings, you must turn on cookies

About Google Scholar   Privacy   Terms   Provide feedback

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Importing Articles from Google Scholar to EndNote Web

Saving into EndNoteWeb

Additional Help
- Contact a librarian.
- Access EndNote Help by clicking the HELP link in the upper right corner of the EndNoteWeb page. A series of short tutorials to help you learn about and use the features of EndNote Web can be found at: http://www.endnoteweb.com/training.

http://libguides.usu.edu/endnote
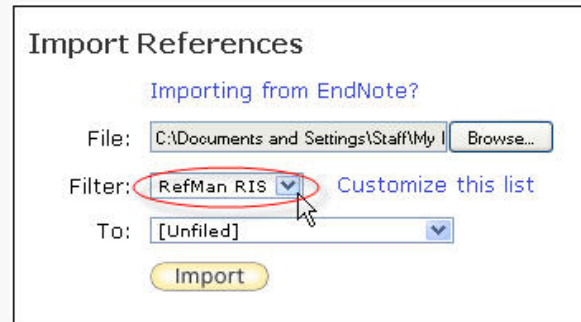
7. Log into EndNote Web.

8. Within EndNote Web, click the **Collect** tab at the top of the page.

My References   Collect

9. Click the **Import References** link.

Import References

10. **Browse** to the file you saved from your Google Scholar search, and select the file.

Import References

Importing from EndNote?

File: C:\Documents and Settings\Staff\My I   Browse...

Filter: RefMan RIS   Customize this list

To: [Unfiled]

Import

11. Choose RefMan RIS format from the **Select** drop-down box (you can choose "Customize this list" to make this option your default option).

12. Click Import to bring your citation list into EndNote Web.

Import

13. The citations will be placed in the **Unfiled** folder. Click the My Reference tab and choose the Unfiled link.

My References   Collect

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WRITING REPORTS

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Importing Articles from Google Scholar to EndNote Web

Citations on EndNoteWeb

EndNote Web
provided by ISI Web of Knowledge®

Managing Your Citations

One of the challenges you will face is how to manage the citations to the journal articles you read and need to cite. There are several tools available to you to assist with this. Two popular options are End Note Web and Zotero. The links below will take you to in-dept guides that will step you through the process of how to use these powerful resources.

NOTE: For Zotero, you will need to download the AIP style from here and install it in order to format according to AIP style.

- Citations: EndNote Desktop for Organizing Citations
  by Connie Woxland   Last Updated Jul 13, 2015   128 views this year

http://libguides.usu.edu/EndNoteBasic

http://libguides.usu.edu/endnote

http://www.endnoteweb.com/training

Additional Help
- Contact a librarian.
- Access EndNote Help by clicking the HELP link in the upper right corner of the EndNoteWeb page. A series of short tutorials to help you learn about and use the features of EndNote Web can be found at: http://www.endnoteweb.com/training.

Help for EndNote Online

http://www.myendnoteweb.com/help/en_us/ENW/help.htm

http://endnote.com/sites/en/files/m/pdf/en-online-qrc.pdf

QUICK REFERENCE GUIDE – ENDNOTE

ENDNOTE ONLINE

Importing Articles from Google Scholar to EndNote Web

Citations on EndNote Basic

EndNote Web

USU Library / LibGuides / Citations: EndNote Basic Home

Citations: EndNote Basic:
Home

Home	Citation Library	Using Citation Records	Create a Bibliography	Cite While You Write	Frequently Asked Questions

What can this libguide do for me?

EndNote Basic is a free, web-based program that stores and organizes citations, and enables you to import citations directly into a Word document. It can be used on its own, or with EndNote Desktop, a more expansive application available for purchase.

See the differences between **EndNote and EndNote Basic here.**

Citation Library: Learn how to build, organize and quickly find citations for your research

Using Citation Records: See how to easily view, search and share your citations with fellow researchers

Create a Bibliography: Explore how you can build a bibliography and easily change the citation style in seconds.

Cite While You Write: Insert references, and format citations and bibliographies automatically while you write papers in Word

Frequently Asked Questions: Still having trouble? Check out this tab to find some quick answers

Create An Account

Sign Up For an Account

1. Log in to EndNote Basic at **https://www.myendnoteweb.com**
2. Click 'Create An Account'
3. Enter the required information and select "I Agree"

Last Updated: Jul 13, 2015 6:04 PM | URL: http://libguides.usu.edu/EndNoteBasic | 🖶 Print Page   Login to LibApps

Subjects: **Research Tips**

http://libguides.usu.edu/EndNoteBasic   http://www.endnoteweb.com/training

Cite While You Write

Cite While You Write

http://libguides.usu.edu/c.php?g=52841&p=339449

Citations: EndNote Basic:
Cite While You Write

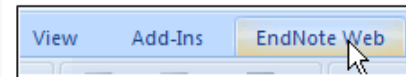| Home	Citation Library	Using Citation Records	Create a Bibliography	Cite While You Write	Frequently Asked Questions

Cite While You Write (CWYW)

Use the EndNote Basic Cite While You Write plug-in to insert references, and format citations and bibliographies automatically while you write papers in Word. To download this plug-in, log into the EndNote Basic site in a web browser (preferably Firefox), and click Download Installers link at the bottom of any page.

Inserting cited references in your Word document

1. With your Word document open, place the cursor in the location where you would like the citation to appear
2. Select **EndNote Web** at the top of the screen (some Word processors will place it under the **Tools** menu)
3. Click **Find Citations** (this tool searches your entire EndNote Basic library)
4. Enter a search term in the **Find Citations** box to find the citation record to insert.
5. Click **Search**
6. Select the desired reference. More then one record can be selected at any given time - simply hold the Ctrl key while clicking each reference.
7. Click **Insert**

The citation appears at the location of the cursor, formatted according to the bibliographic style specified. The reference information is also automatically added to the bibliography at the end of your manuscript

Need more assistance? See the EndNote tutorial video **here**

Skiing is a fabulous sport, especially when one lives in Utah

| View | Add-Ins | EndNote Web |

Last Updated: Jul 13, 2015 6:04 PM | URL: http://libguides.usu.edu/EndNoteBasic | Print Page

Subjects: **Research Tips**

cwyw-w.do

Home   Insert   Page Layout   References   Mailings

Find Citation   Go to EndNote Web   Edit Citation(s)

Style: Chicago 15th B
Update Citations and Bibliography
Convert Citations and Bibliography

Citations   Bibliography

| Find: | powder | | Search |

Example: Enter **Billoski dinosaur extinction** to search for these terms in all fields

Author	Year	Title
Aschwanden		2007 Nordic Gear Guide
Fox	2006	Powder Trip

| Insert | Cancel | Help |

2 items in list
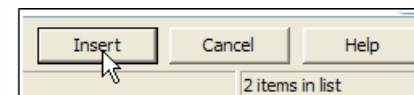
Skiing is a fabulous sport, especially (Fox, 2006) when one lives in Utah

Fox, P., 2006, Powder Trip, New York Times.
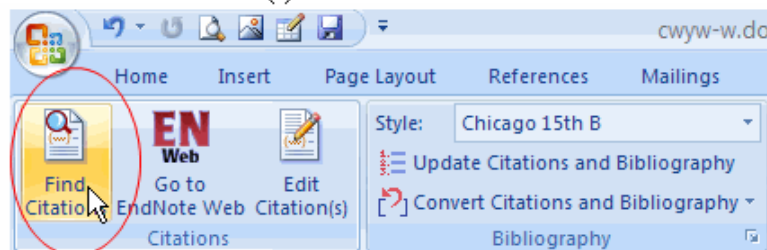
Cite While You Write

Organize Citations within your Library

Create "groups" - which work similarly to folders - to keep citations from different research projects separate, and then add references to those groups to stay organized:

Creating groups in EndNote Basic:

1. Click the yellow **Organize** tab
2. Click **New Group** under **Manage My Groups**
3. Name your group and click **OK**

Putting references in groups:

When citation records are imported in EndNote Basic they are automatically placed in the Unfiled group

1. Click the box to the left of the desired records OR click **All** or **Page**
2. Select the **Add to Group** drop-down menu near the top of the page. Select the desired group. All selected citation records will be moved to that group.

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Cite While You Write

Format Bibliography

http://www.endnote.com/training/tutorials/enweb2/English/EndNote_Web-English/EndNote_Web.asp

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An Exercise in Reference Management and Use

Use Google Scholar to find:

- A physics related article by an author with your last name
- An article in American Journal of Physics related to this topic
- An article from within the last 2 years related to this topic
- An article from before you were born related to this topic

Use Google Scholar and EndNote to:

Use Google Scholar to save citations to these 4 articles in EndNote format

Write a sort paragraph about the physics topic.

Use EndNote Cite-While-You-Write to provide citations for your paragraph.

Use EndNote to create a bibliography for your paragraph using the AIP Style

Intermediate Lab

PHYS 3870

CONVEYIMG INFORMATION

Gathering Information

Installing and Using DataThief

References: PHYS 3870 Web Site

USU Library

DataThief Manual
DataThief Web Site

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DataThief

DataThief III is program to digitize data in various forms for subsequent plotting and analysis. It is often used to "borrow" data from scanned graphs in articles. DataThief is a "free" shareware program and is very easy to use.

The presentation includes:
- *Instructions on how to download and install the program and where to get supporting documentation.*
- *A detailed set of instruction on how to use the program to digitize data from a picture of a graph.*
- *A simple example of acquiring digitized data from a photograph .*

A simple exercise in use of DataThief is described in the *file*
PHYS 2500 Sec5-Graphing DataThief Exercise.ppt.

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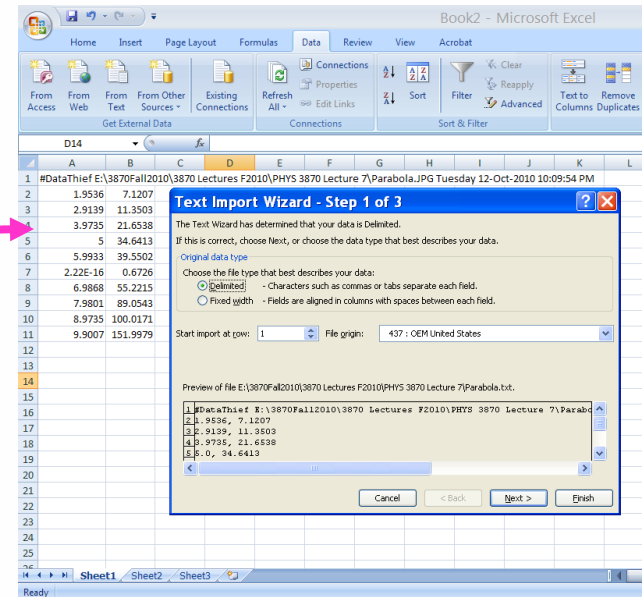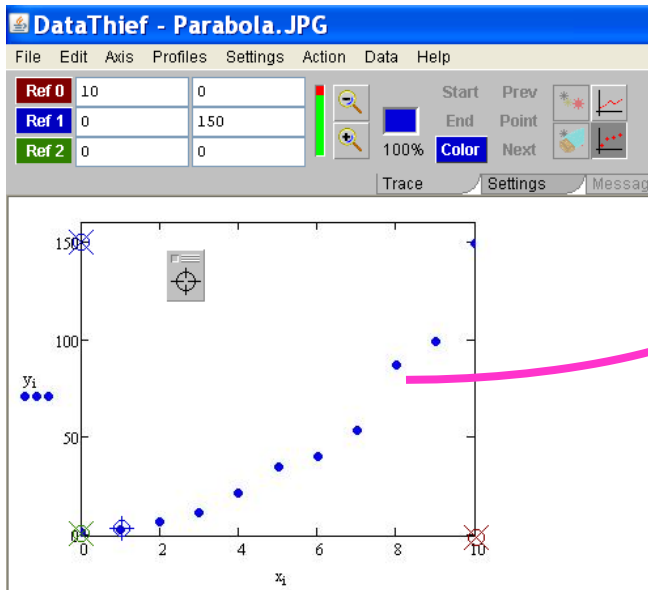
Acquiring DataThief III

DataThief III is already installed and running on the PHYS 2500 CITRIX page.

To acquire and install your own copy of the shareware program DataThief III and its accompanying documentation, simply follow the numbered steps listed here.
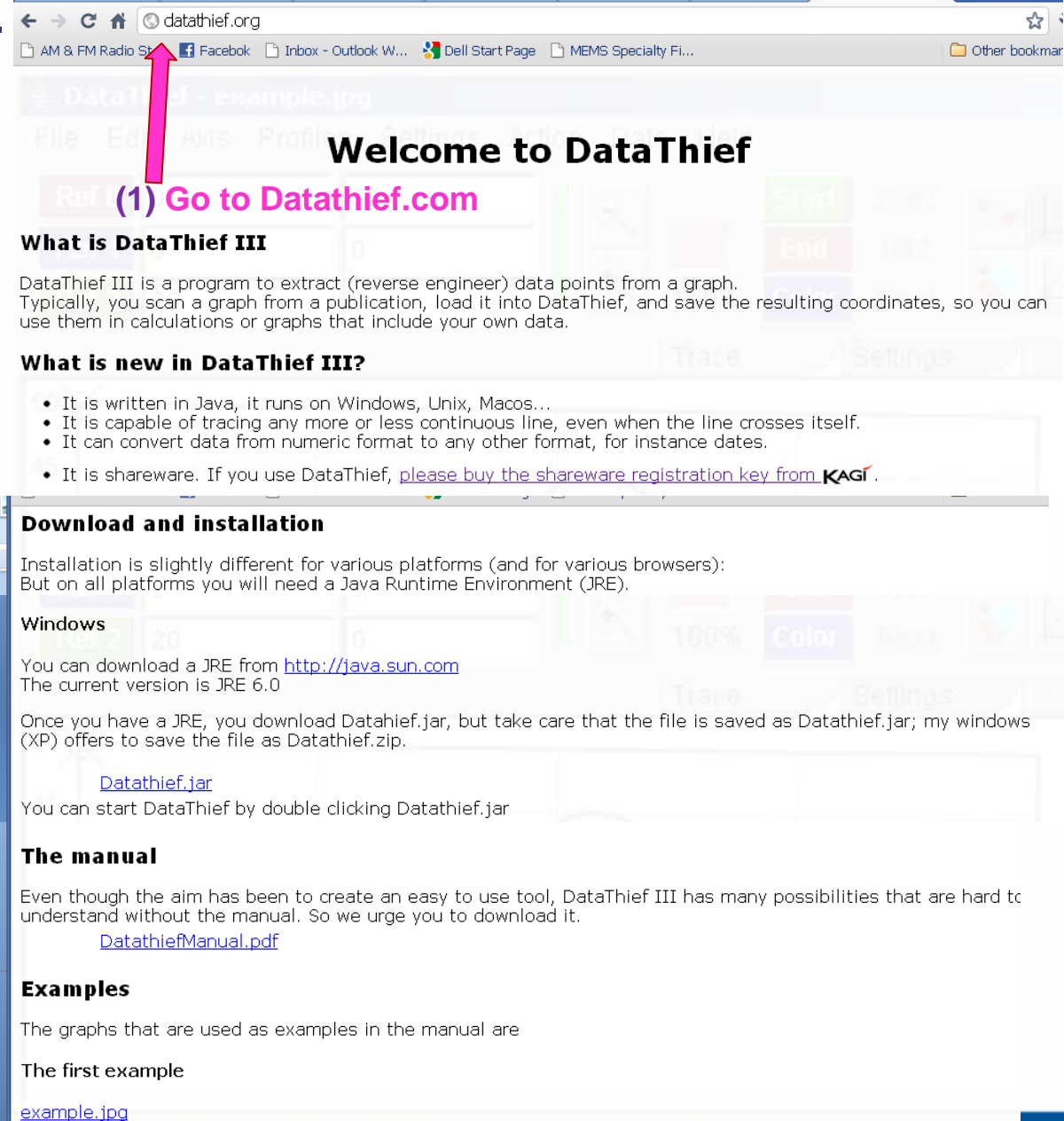
(2) Review the program Description

(3) (Download Java as well, if you need it.)

Download the executable program file Datathief.jar by Clicking here

(4) Download the manual

(5) Review some examples, if you like.

---

datathief.org

AM & FM Radio St... | Facebok | Inbox - Outlook W... | Dell Start Page | MEMS Specialty Fi... | Other bookmar

Welcome to DataThief

(1) Go to Datathief.com

What is DataThief III

DataThief III is a program to extract (reverse engineer) data points from a graph.
Typically, you scan a graph from a publication, load it into DataThief, and save the resulting coordinates, so you can use them in calculations or graphs that include your own data.

What is new in DataThief III?

- It is written in Java, it runs on Windows, Unix, Macos...
- It is capable of tracing any more or less continuous line, even when the line crosses itself.
- It can convert data from numeric format to any other format, for instance dates.

- It is shareware. If you use DataThief, please buy the shareware registration key from **KAGI**.

Download and installation

Installation is slightly different for various platforms (and for various browsers):
But on all platforms you will need a Java Runtime Environment (JRE).

Windows

You can download a JRE from http://java.sun.com
The current version is JRE 6.0

Once you have a JRE, you download Datahief.jar, but take care that the file is saved as Datathief.jar; my windows (XP) offers to save the file as Datathief.zip.

Datathief.jar
You can start DataThief by double clicking Datathief.jar

The manual

Even though the aim has been to create an easy to use tool, DataThief III has many possibilities that are hard to understand without the manual. So we urge you to download it.
DatathiefManual.pdf

Examples

The graphs that are used as examples in the manual are

The first example

example.jpg

Orientation to DataThief III

DataThief III is written in Java. This means, that apart from the "executable" called *Datathief.jar*, you will have to have the Java Virtual Machine. The Java Virtual Machine can be downloaded from *www.java.com.* Follow the instructions that are appropriate for your machine.

Once the virtual machine is installed, you may start DataThief.
- **On Windows, double click the Datathief.jar icon.**
- **On Macintoshes with MacOS 8 or MacOS 9, double click the Datathief application icon.**
- **On Macintoshes with MacOS X and on Linux or Unix either double click the Datathief icon, or go to the directory where you installed DataThief and type Datathief.**

Once you have a running DataThief, select "Open..." from the File menu, and select the file you want to take data from. In this example, we used "example.png". Key features of DataThief are shown below.

3 point indicators used to find the corresponding coordinate indicator

tool bar

menu bar

Start location indicator (green with a + through its center)

"Dump", used to define data points

Color location indicator (blue with a + through its center)

3 coordinate indicators have an X through there center

White area with the image in it is the image area

Stop location indicator (red with a + through its center)

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DataThief in Action

To use DataThiefIII to digitize data from a graph:

(1) Open DatathiefIII.

(2) Select an image file using Open from the File menu.
Allowed file types include gif, jpg, and png.

(3) Select whether to digitize a point graph or line graph

(4) Define the graph axes by tagging 3 axis coordinate indicators by dragging and dropping the 3 circled X icons onto the axes points and entering the corresponding numerical values.

Note: If the 3 axes points are not visible on the graph, select Reset from the Actions menu. Click a colored button (e.g., Ref 0) to flash the corresponding axis point

Note: For pictures you can use this to put the digitized values in the correct units if you know the values of these three points.

Note: This can correct for skewed axes by selecting non-orthogonal axes.
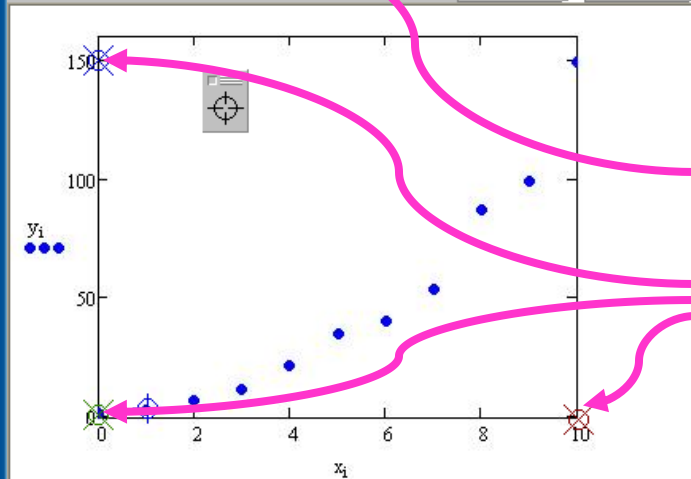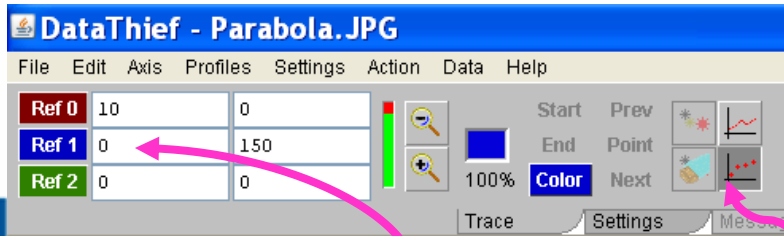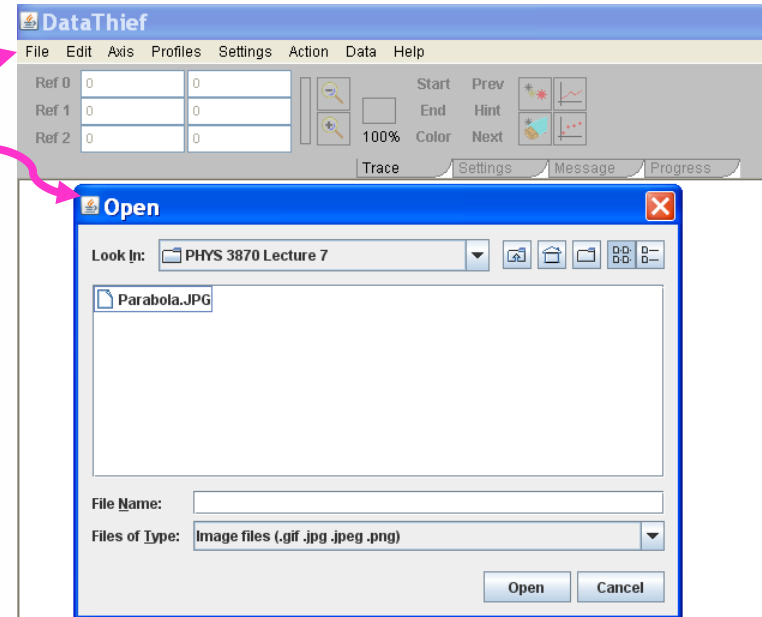
Setting DataThief

Simply follow the remaining numbered steps listed here.

DataThief - Parabola.JPG

File   Edit   Axis   Profiles   Settings   Action   Data   Help

(7) Export
The data to a file
using the File menu

Open...	Ctrl+O
Save	Ctrl+S
Save as...	Ctrl+Shift+S
Export data...	Ctrl+E
Quit	Ctrl+Q

Start   Prev
End   Point
100% Color Next

Trace   Settings   Message   Progress
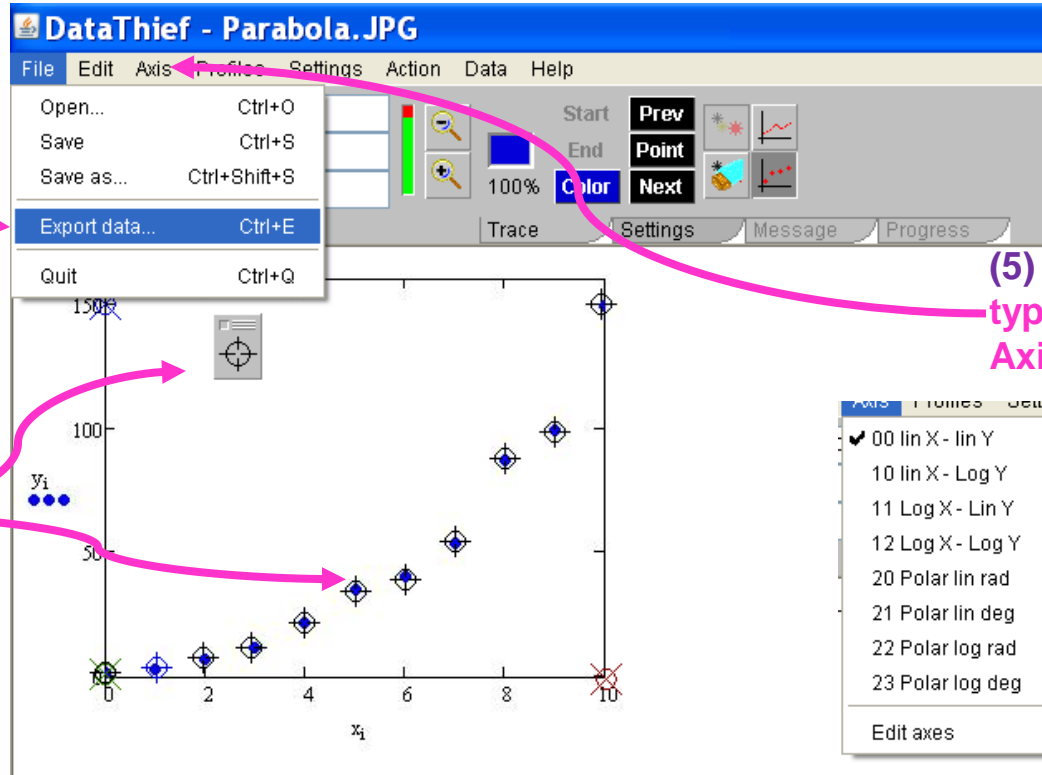
(5) Select axes type using the Axis menu

Axis   Profiles   Settings
✔ 00 lin X - lin Y
10 lin X - Log Y
11 Log X - Lin Y
12 Log X - Log Y
20 Polar lin rad
21 Polar lin deg
22 Polar log rad
23 Polar log deg
Edit axes

(6) To "borrow" discrete data points, select the *Point* mode icon and then tag each data point by dragging crosshairs from the "Dump" on top of the point

(5 Alternate) To "borrow" data from traces (lines):
- **Select the *Trace* mode icon,**
- **Tag the beginning and end of the trace to "steal" with the green and red icons, respectively**
- **Set the color of the line by dropping the blue icon on a well isolated portion of the trace**
- **Use the three point indicators "*Start*", "*End*" and "*Color*" to locate the icons to drag.**
- **The density of data points digitized can be adjusted using the "*Output Distance*" selection from the *Settings* tab.**

Reading DataThief Txt Files

(8) **Read into an Excel file as comma delimited text using the Excel Text Import Wizard called up from the "From Text" icon on the Data ribbon in Excel.**

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Intermediate Lab

PHYS 3870

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Gathering Information

An Example of Using DataThief and Mathcad

References: PHYS 3870 Web Site

USU Library

DataThief Manual
DataThief Web Site

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DataThief--Fitting Example

This example uses *Mathcad* to fit the digitized coordinates of a photograph to a mathematical model, leading to an analytical expression used for further analysis. The digitized results were produced using *DataThiefIII.*

An ellipsoidal mirror used in a Class AAA Solar Simulator needed to be adjusted to provide better focusing. This required a mathematical model of the mirror surface in terms of foci and radii. Direct measurement of the 3D mirror was difficult and was made even harder by the surrounding support structure and enclosure.

• A photograph of the system was taken and the JPG file imported in to *DataThiefIII* (right).
• The axes were identified. (The image was cropped in Photoshop to create a cleaner image. This step was not strictly necessary.).
• Points on the mirror were then digitized using Datathief
• Data were written to a two column, tab delimited text file.
• The data file was then read in to *Mathcad.*
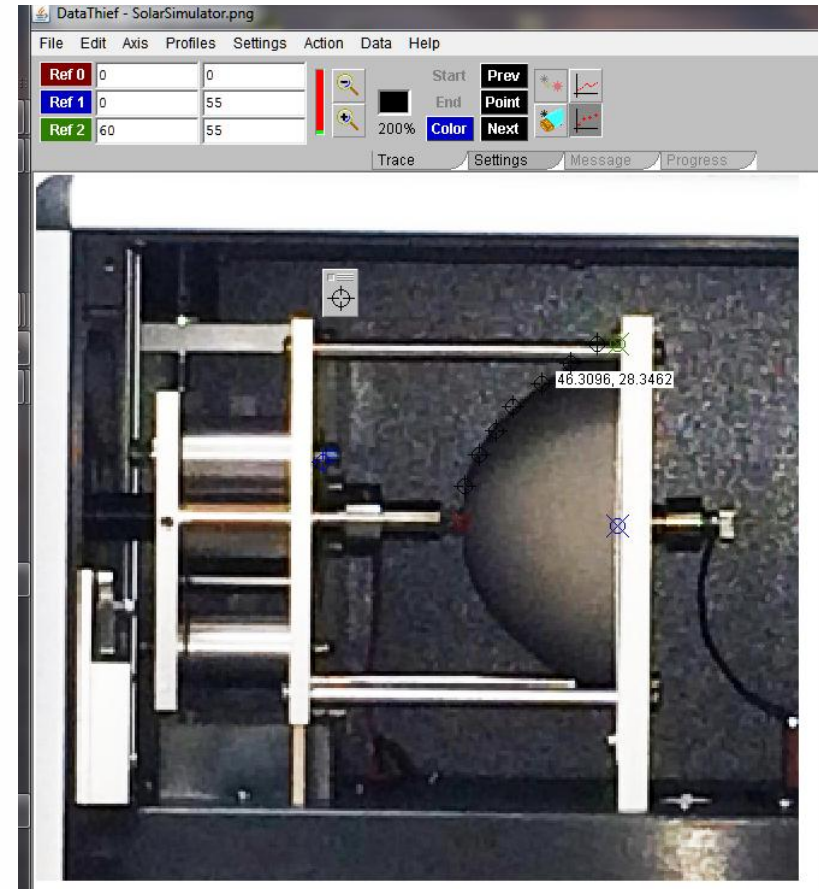
DataThief--Fitting Example

Read In Data from File

$Mirror :=$

I:...\mirror data points.txt

Define offsets to the measured data:

$$x_{Offset} := 0 \cdot mm \qquad\qquad y_{Offset} := 1 \cdot mm$$

Parse x and y data and add units:

$$MirrorData^{\langle 0 \rangle} := Mirror^{\langle 0 \rangle} \cdot mm - min\left(Mirror^{\langle 0 \rangle}\right) \cdot mm - x_{Offset}$$

$$MirrorData^{\langle 1 \rangle} := Mirror^{\langle 1 \rangle} \cdot mm - y_{Offset}$$

Separate data into positive and negative limbs of the ellipse:

For $\quad i := 12, 11 .. 0$

$$MirrorData\_p_{i,0} := MirrorData_{i,0}$$

$$MirrorData\_p_{i,1} := MirrorData_{i,1}$$

For $\quad j := 12 .. 24$

$$MirrorData\_n_{j,0} := MirrorData_{j,0}$$

$$MirrorData\_n_{j,1} := MirrorData_{j,1}$$

DataThief--Fitting Example

Fit the Data

List a general form of an ellipse and define fitting functions for the positive and negative limbs of the ellipse:

General Form:
$$y^2 - 2R \cdot x + (K+1) \cdot x^2 = 0$$

Positive limb:
$$y_p(x,R,K) := \sqrt{2R \cdot x - (K+1) \cdot x^2}$$

Negative limb:
$$y_n(x,R,K) := -\sqrt{2R \cdot x - (K+1) \cdot x^2}$$

Define initial guesses for the fitting function parameters, radius and focus:

Radius:
$$R := 35 \cdot mm$$

Focus:
$$K := -0.8$$

Put these parameters in a single unitless vector for use with genfit:

$$param_{in} := \begin{pmatrix} \dfrac{R}{mm} \\ K \end{pmatrix} = \begin{pmatrix} 35 \\ -0.8 \end{pmatrix}$$

Define the values to plot:
$$x := 0 \cdot mm, 1 \cdot mm .. 60 \cdot mm$$

Use the *Mathcad* function $genfit(X, Y, param_{in}, y_{fit})$ to fit these data for the separate limbs to obtain the best values for the fitting parameters, y_{p_fit} and y_{n_fit}

$$y_{p\_fit} := genfit\left(\frac{MirrorData\_p^{\langle 0 \rangle}}{mm}, \frac{MirrorData\_p^{\langle 1 \rangle}}{mm}, param_{in}, y_p \right) = \begin{pmatrix} 36.75 \\ -0.87 \end{pmatrix}$$

$$y_{n\_fit} := genfit\left(\frac{MirrorData\_n^{\langle 0 \rangle}}{mm}, \frac{MirrorData\_n^{\langle 1 \rangle}}{mm}, param_{in}, y_n \right) = \begin{pmatrix} 38.73 \\ -0.84 \end{pmatrix}$$

Average the radii and foci from the two separate fits for the positive and negative limbs to obtain the best values.

$$R_{mean} := mean\left(y_{p\_fit_0}, y_{n\_fit_0} \right) \cdot mm = 0.04 \, m$$

$$K_{mean} := mean\left(y_{p\_fit_1}, y_{n\_fit_1} \right) = -0.86$$

DataThief-- Fitting Example

Plot the Data

Fit to Ellipsoidal Mirror

Vertical Distance (mm) vs *Horizontal Distance (mm)*

— Ellipsoid Fit (optimized)

– – + Fit (with initial guesses)

●● Digitized Data
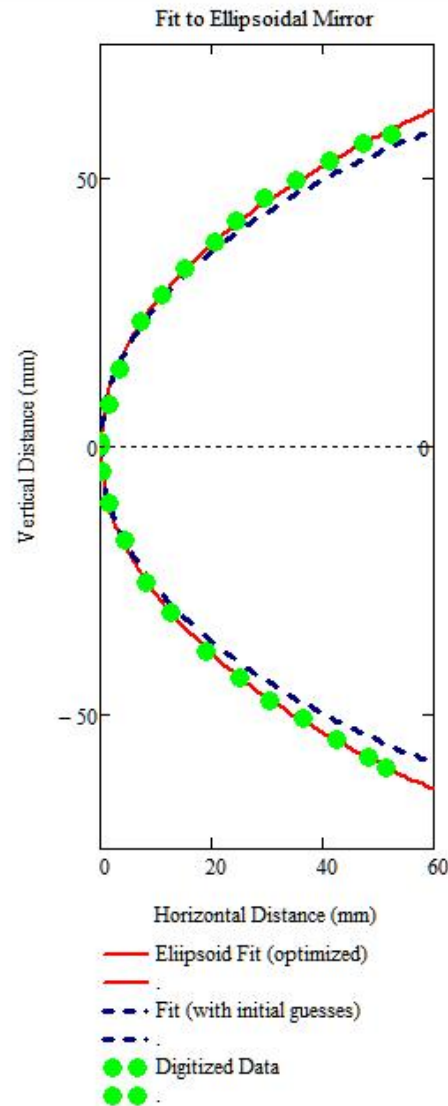
Summary The mirror can be modeled well by the ellipsoid equation $y^2 - 2R \cdot x + (K + 1) \cdot x^2 = 0$ with the fitting parameters of radius $R = 35\,mm$ and focus $K = -0.8$.

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CONVEYIMG INFORMATION

Analyzing and Plotting Data with Excel

References: PHYS 3870 Web Site

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Instructions for an Excel Tutorial Exercise

Follow the detailed (if boring) instructions to create an Excel worksheet to analyze and plot a sample data set and prepare a simple report.

Instruction for Data Analysis with EXCEL

Overview of Excel Spreadsheets

We begin by reviewing some basic concepts for spreadsheet programs, starting from the full program and gradually zooming in to the details. But first, open the Excel *Workbook* file named "*Excel Data Analysis*" and save your *Workbook* with a new name by selecting **File>Save As** from the Menu Bar and giving the file the name "*Your_Last_Name-Excel Data Analysis*".
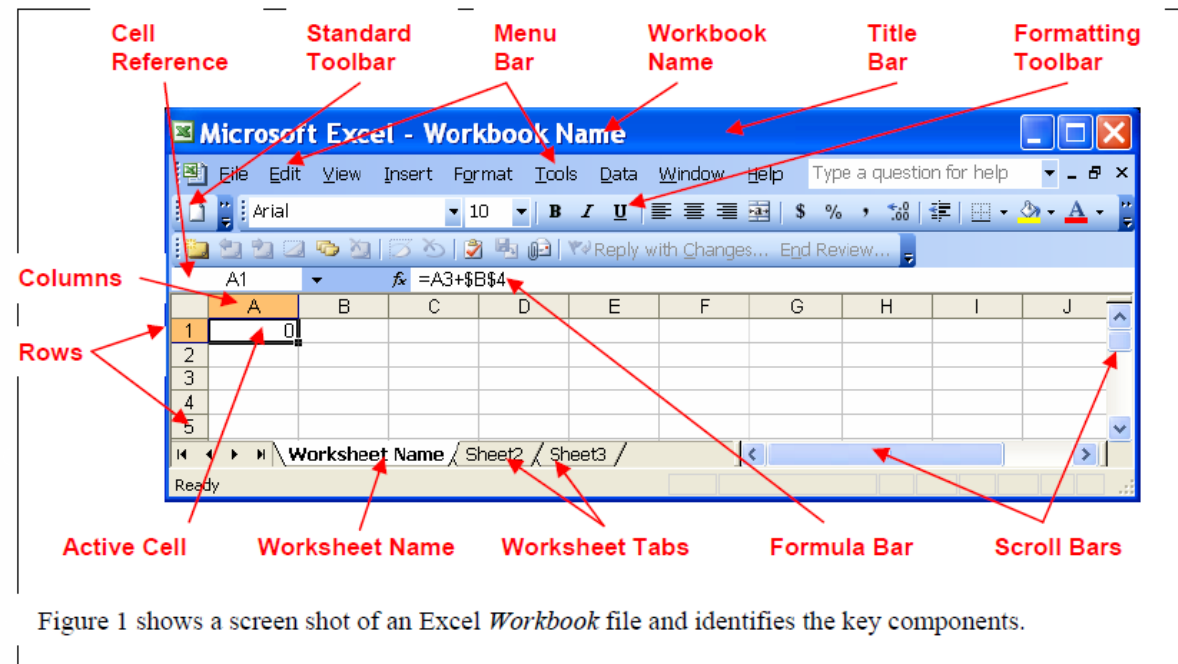
Figure 1 shows a screen shot of an Excel *Workbook* file and identifies the key components.

Report from an Excel Tutorial Exercise

Follow the detailed (if boring) instructions to create an Excel worksheet to analyze and plot a sample data set and prepare a simple report.

PHYS 2500 EXCEL DATA ANALYSIS PROJECT REPORT

Name: Enter name here
Date: Enter current date here

Experiment Description
Add a paragraph describing the experiment performed.

Summary of Results
Add a paragraph describing the results of your experiment.

Summary of Fit
##

Fitting Function
y(t)=A*sin(w*t+θ)+yo

Fitting Parameters

Parameter	Symbol	Value	Units
Amplitude	A	0.0715	m
Angular frequency	w	3.9026	Hz
Phase	θ	-0.21	
Offset	yo	0.2412	m

Goodness of Fit

Number of Data Points	41
Number of Fitting Parameters	4
Degrees of Freedom	37
Chi Squared Value for Fit	29.24653
Reduced Chi Squared Value	0.790447

Excel File for 2500 Ch 11-JR.xls
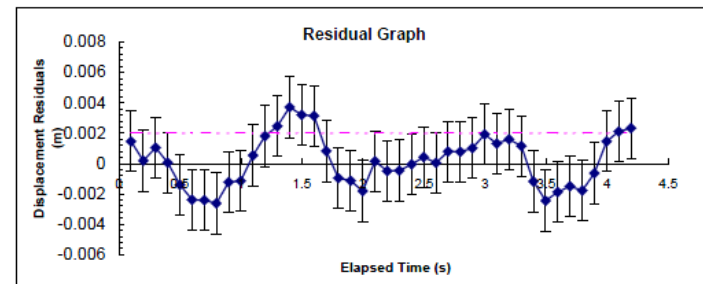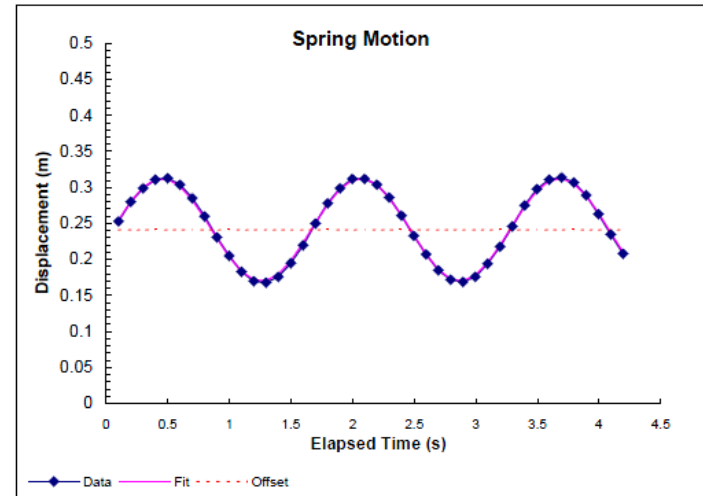
Project Report

1   11/23/2009

Spring Motion

Residual Graph
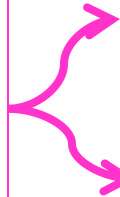
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PHYS 3870

CONVEYIMG INFORMATION

Analyzing and Plotting Data with IGOR Pro

References: PHYS 3870 Web Site

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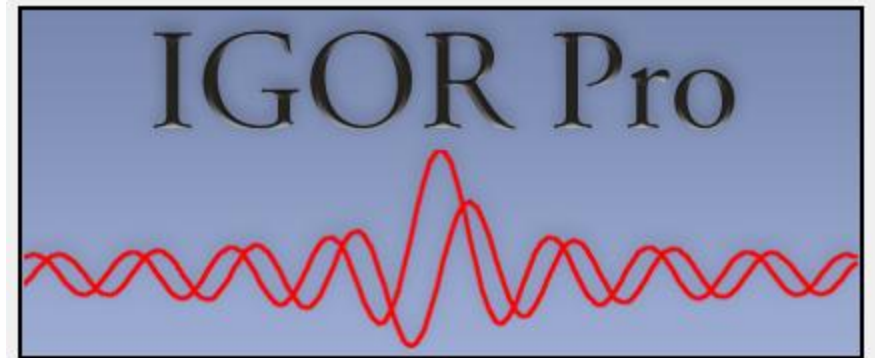
IGOR Pro Tutorials

Getting Started.ihf

• Getting Started

This help file contains overview and guided tour material and constitutes an essential introduction to Igor Pro. The main sections are:

- Introduction to Igor Pro
- Guided Tour 1 - General Tour
- Guided Tour 2 - Data Analysis
- Guided Tour 3 - Histograms and Curve Fitting

We strongly recommend that you read at least the first two sections.

The material in this help file is duplicated in Volume I of the Igor Pro PDF manual which is accessible through the Help menu.

• Introduction to Igor Pro

Igor is an integrated program for visualizing, analyzing, transforming and presenting experimental data.

Igor's features include:

- Publication-quality graphics
- High-speed data display
- Ability to handle large data sets
- Curve-fitting, Fourier transforms, smoothing, statistics and other data analysis
- Waveform arithmetic
- Image display and processing
- Combination graphical and command-line user interface
- Automation and data processing via a built-in programming environment
- Extensibility through modules written in the C and C++ languages

Some people use Igor simply to produce high-quality, finely-tuned scientific graphics. Others use Igor as an all-purpose workhorse to acquire, analyze and present experimental data using its built-in programming environment. We have tried to write the Igor program and this manual to fulfill the needs of the entire range of Igor users.

Example of Publication Quality Graphs with IGOR Pro
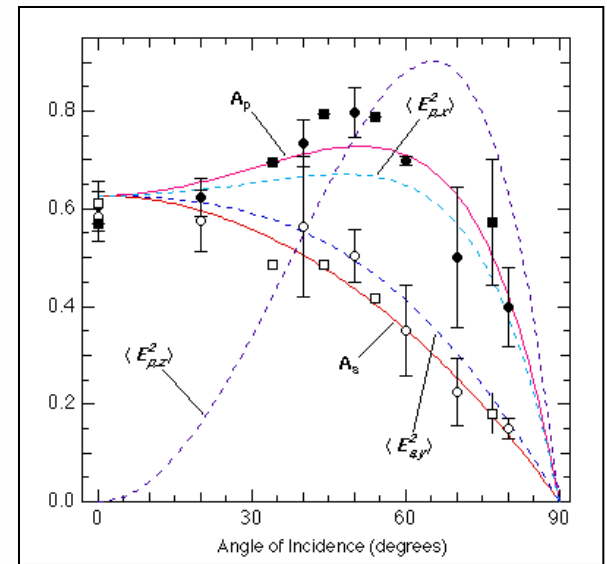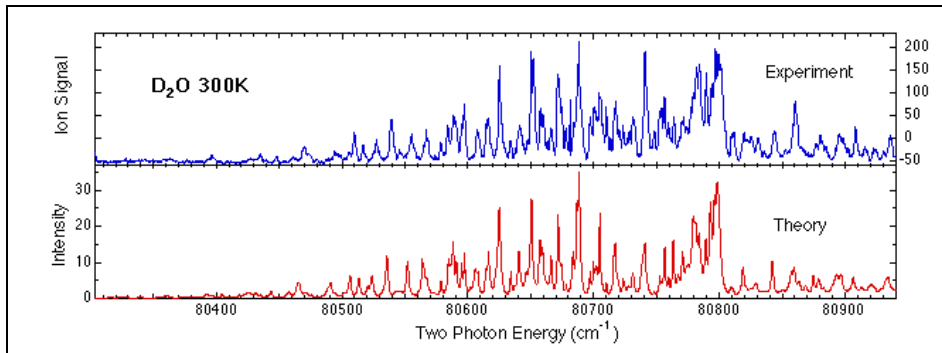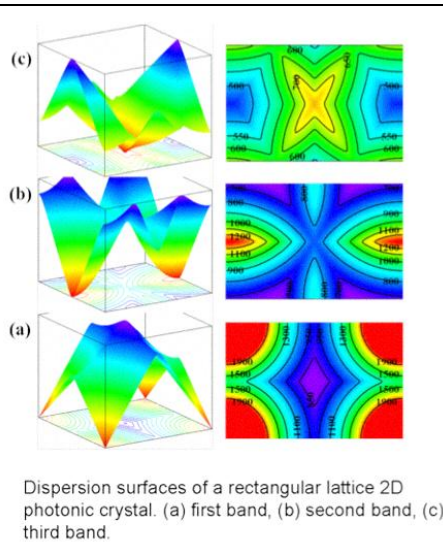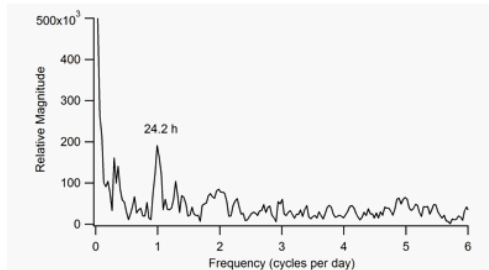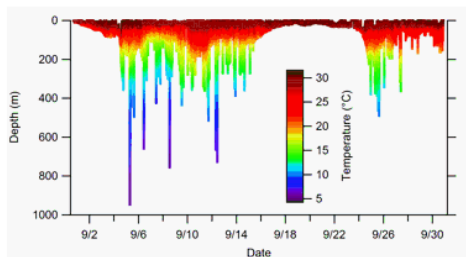
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Fall 2015

WRITING REPORTS

Lecture 6 Slide 63

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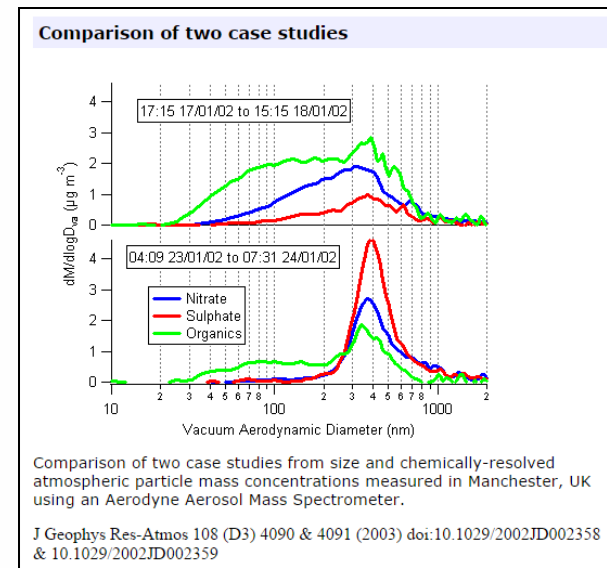
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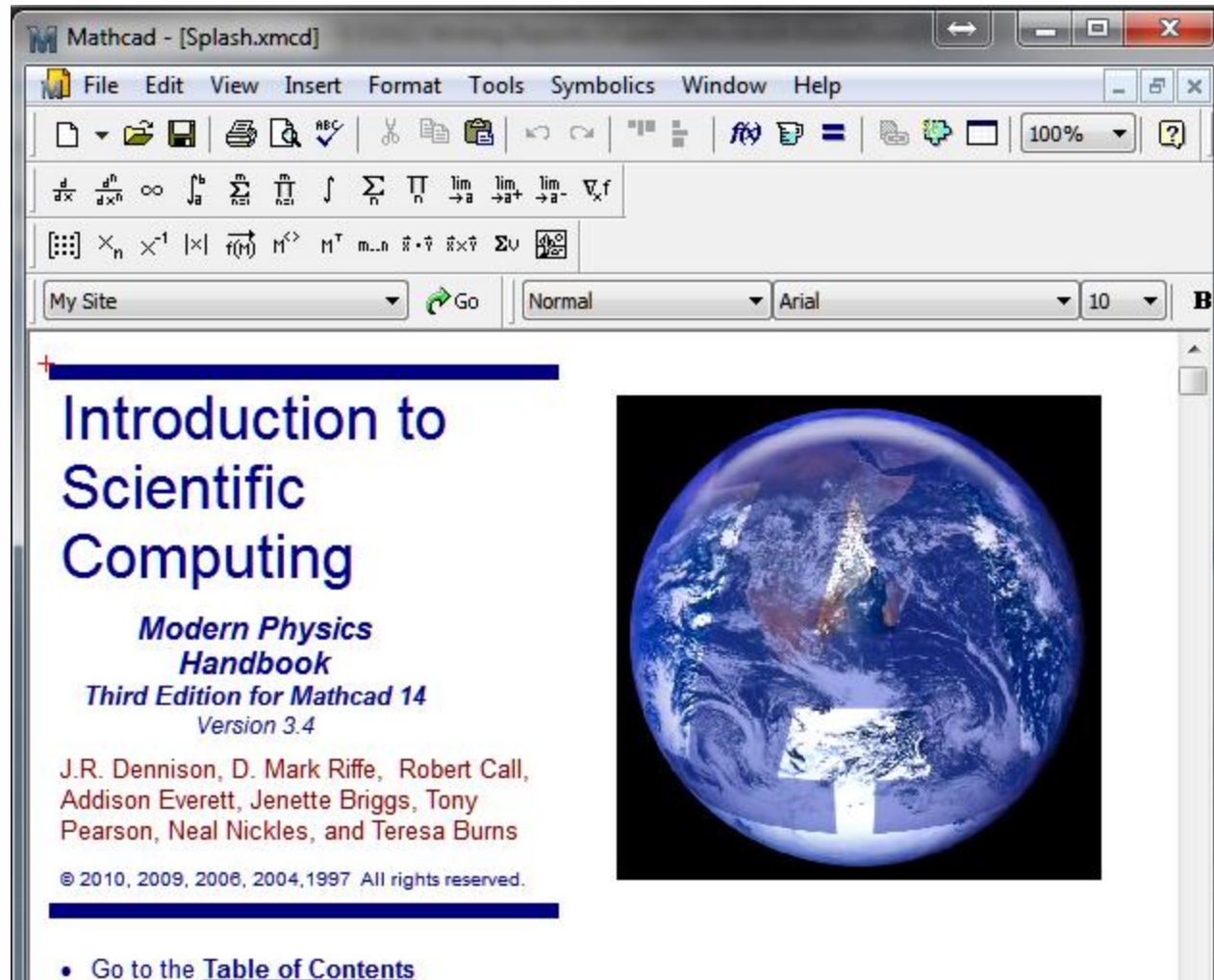
Analyzing and Plotting Data with Mathcad

References: PHYS 3870 Web Site

PHYS 2500 Tutorial

PHYS 2500 Introduction to Scientific Computing
Mathcad Tutorials

PHYS 2500 Introduction to Scientific Computing Mathcad Tutorials

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CONVEYIMG INFORMATION

Gathering Information

An Exercise in DataThief, Plotting and Curve Fitting

References: PHYS 3870 Web Site

USU Library

DataThief Manual
DataThief Web Site

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Introduction to Scientific Computing

PHYS 2500

An Exercise In Data Analysis

➢ **Use *DataThief* to "steal" data from the graph in *DennisonInFreefall.jpg* and save the data in the file *YOURNAMEInFreefall.txt*:**

➢ **In your favorite plotting and curve fitting program:**
- Import the data from *DennisonInFreefall.jpg* stored in *YOURNAMEInFreefall.txt*
- Import the data from *FreefallLab.txt*
- Create a single graph of position vs time with:
  - Data points and error bars from *FreefallLab.txt*
  - Data points (the slacker has no error estimates here!) from *DennisonInFreefall.jpg*
  - A mathematical model for free fall plotted as a line
  - List your best estimates for values and errors for you model fitting parameters
- BONUS:
  - Lineraize your model, that is plot the dependant variable versus some function (e.g., square, square root) of the dependant variable such that the plot yields a straight line
  - Plot both data sets (with appropriate errors) and your linear model on a linearized graph
  - Do an automated fit with your linear model to the FreefallLab data. List your best estimates of the slope and intercept (with errors) and from these the best estimates (with errors) for you original model fitting parameters.
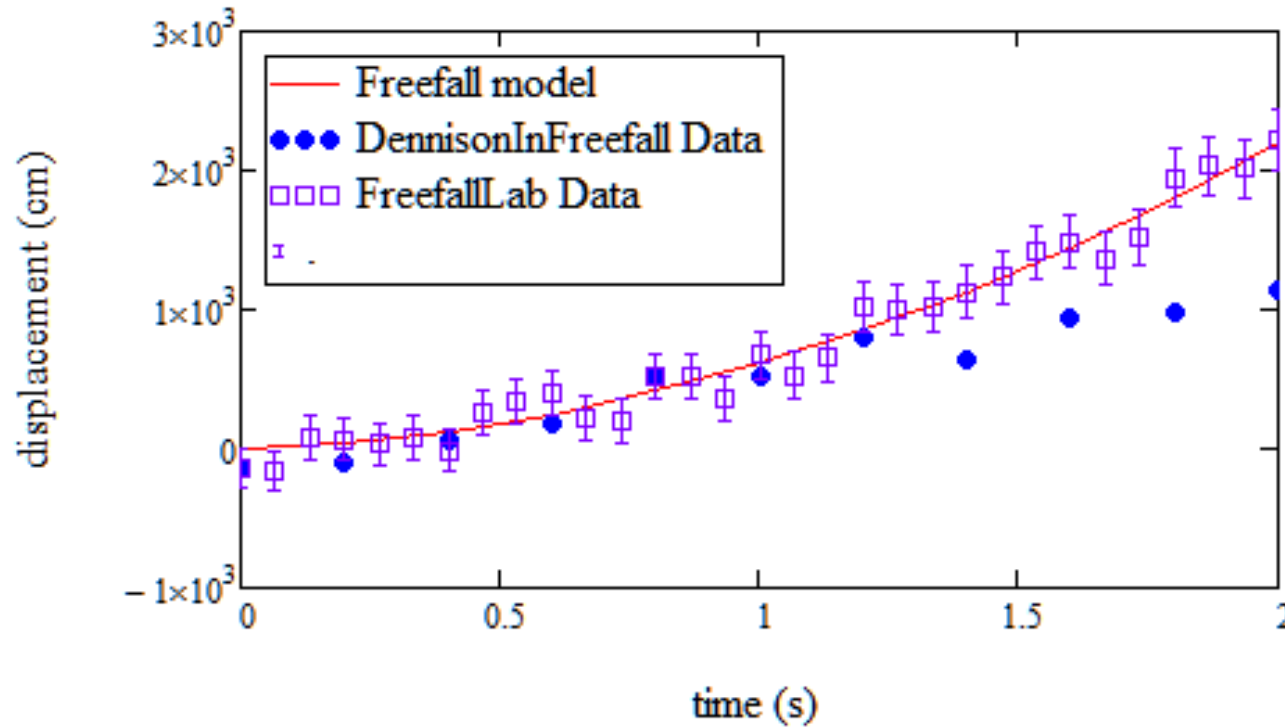
Data for An Exercise In Data Analysis

Freefall.txt

DennisonInFreefall.jpg
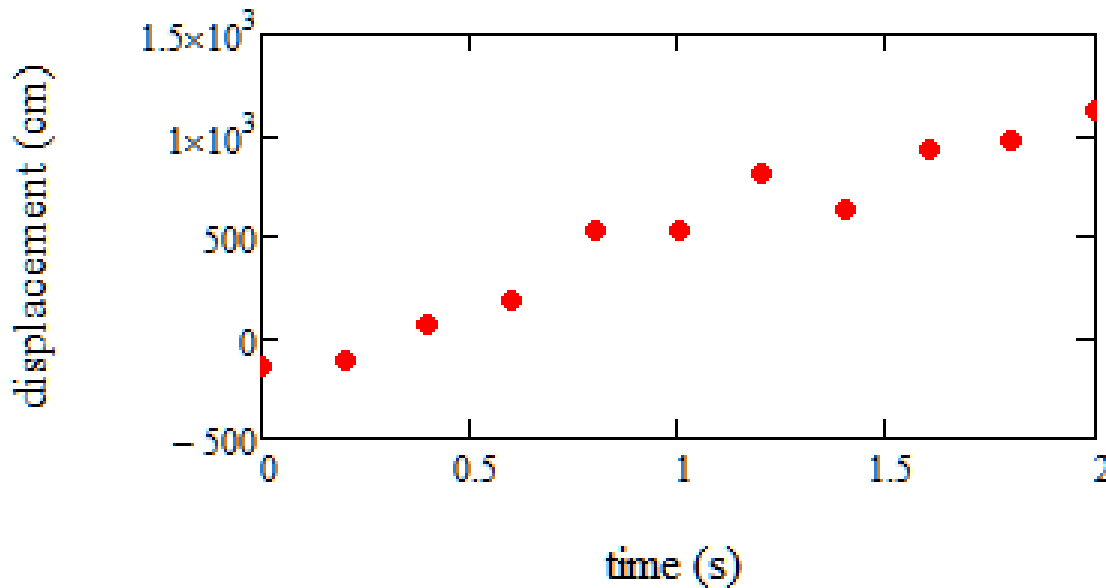
time(s)	disp(m)	error(m)
0	-137.5	145.9
0.06667	-157.6	145.3
0.1333	81.61	152.4
0.2	62.14	151.9
0.2667	30.93	150.9
0.3333	81.17	152.4
0.4	-12.04	149.6
0.4667	258.4	157.8
0.5333	334.6	160
0.6	398.2	161.9
0.6667	218.3	156.5
0.7333	202.9	156.1
0.8	524.1	165.7
0.8667	516.4	165.5
0.9333	368.3	161
1	672	170.2
1.067	527.9	165.8
1.133	656.7	169.7
1.2	1018	180.5
1.267	1004	180.1
1.333	1029	180.9
1.4	1128	183.8
1.467	1234	187
1.533	1412	192.4
1.6	1489	194.7
1.667	1364	190.9
1.733	1521	195.6
1.8	1949	208.5
1.867	2031	210.9
1.933	2016	210.5
2	2222	216.6

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Results for An Exercise In Data Analysis

Model is $y(t) = (1/2)at^2 + v_o t + y_o$

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An Exercise in Reference Management and Use

Use Google Scholar to find:

- A physics related article by an author with your last name
- An article in American Journal of Physics related to this topic
- An article from within the last 2 years related to this topic
- An article from before you were born related to this topic

Use Google Scholar and EndNote to:

Use Google Scholar to save citations to these 4 articles in EndNote format

Write a sort paragraph about the physics topic.

Use EndNote Cite-While-You-Write to provide citations for your paragraph.

Use EndNote to create a bibliography for your paragraph using the AIP Style