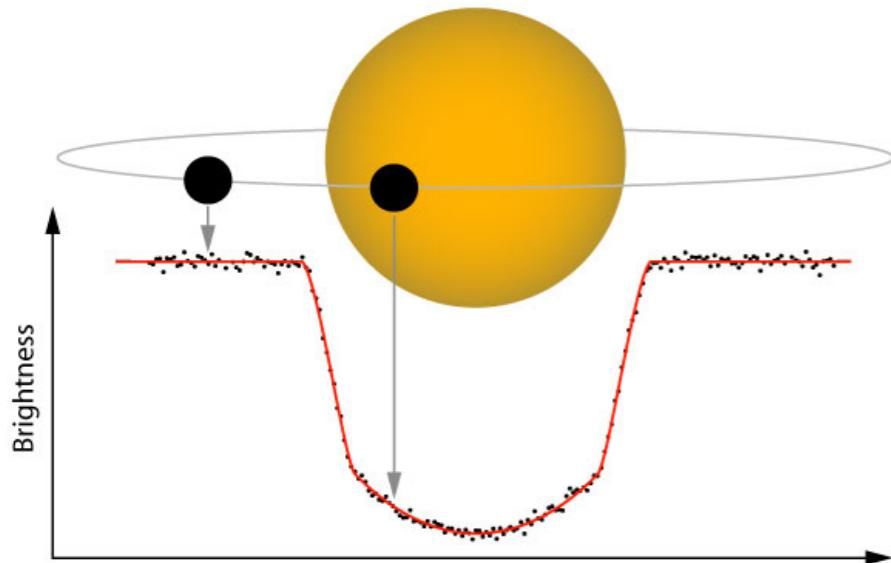
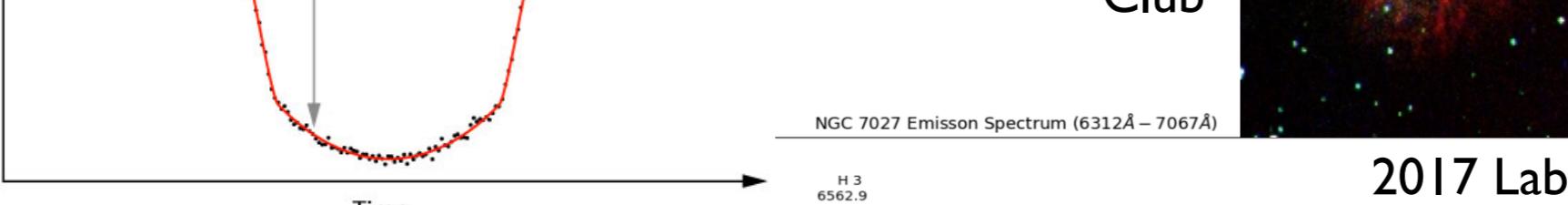
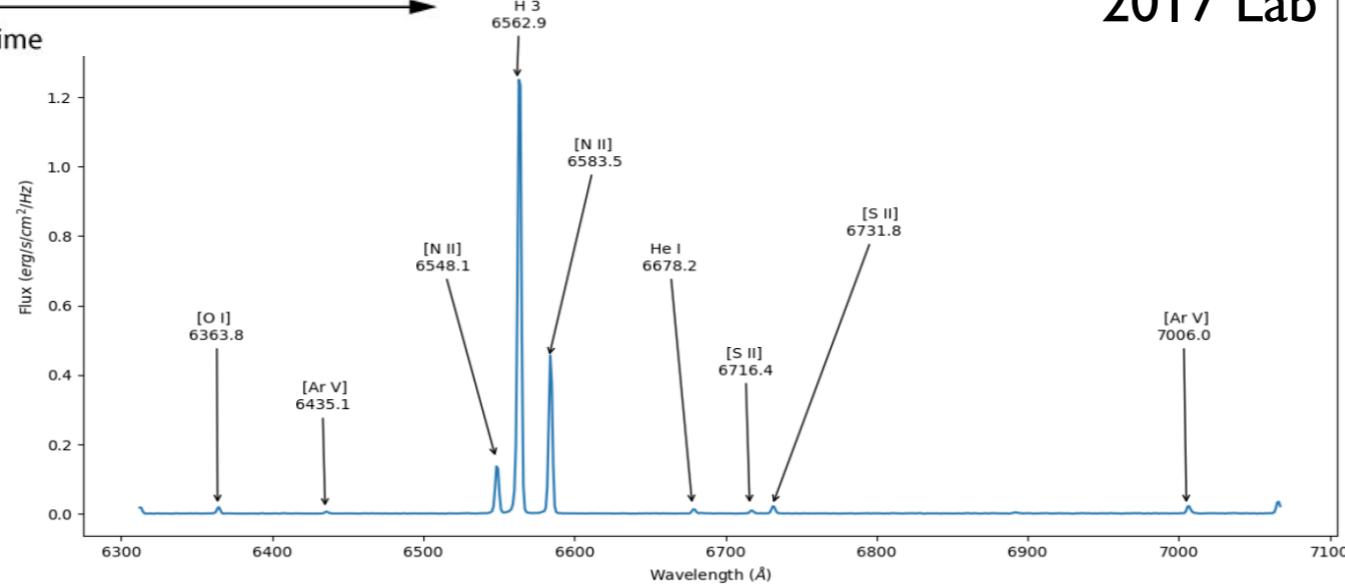


# PHY 517 / AST 443: Observational Techniques in Astronomy

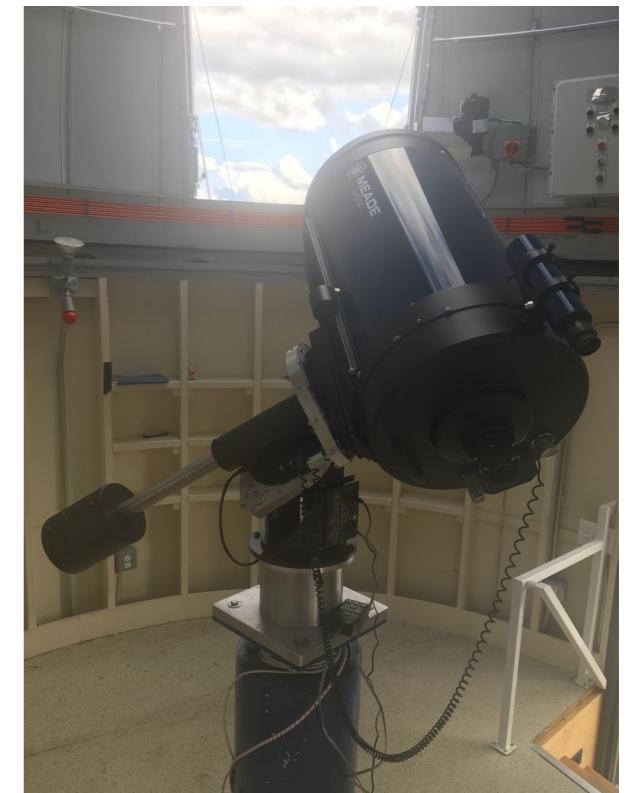
Anja von der Linden



ESO



2017 Lab



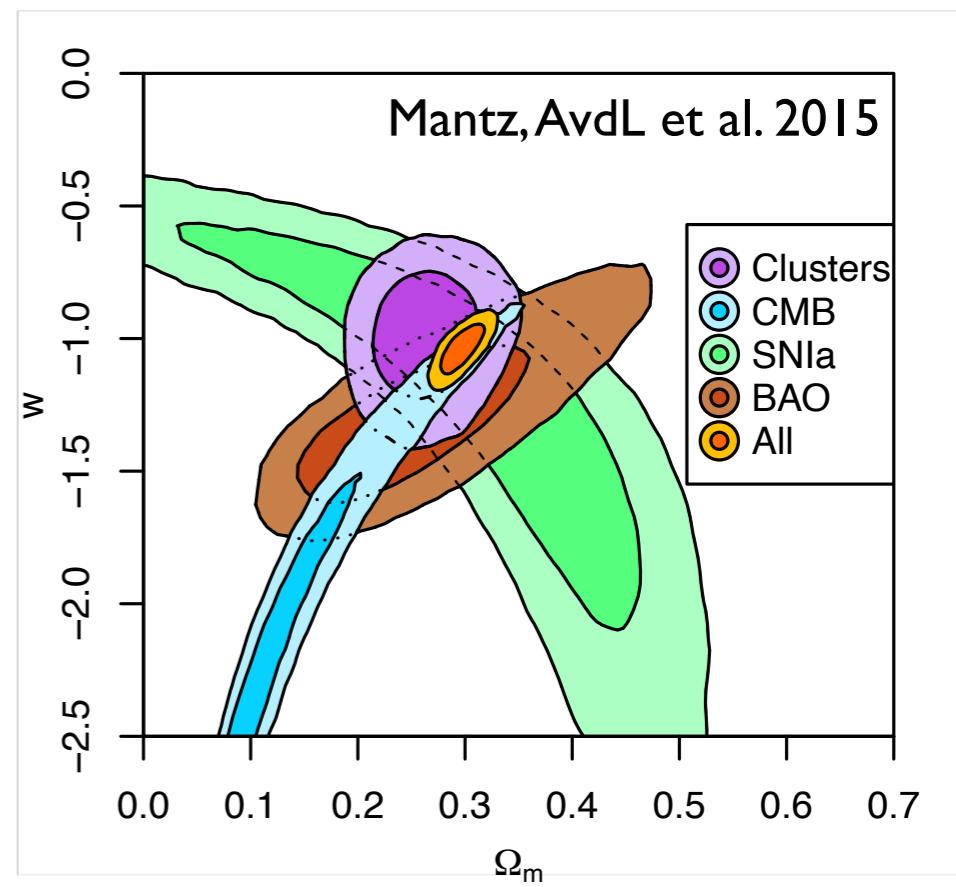
AvdL

Fall 2022



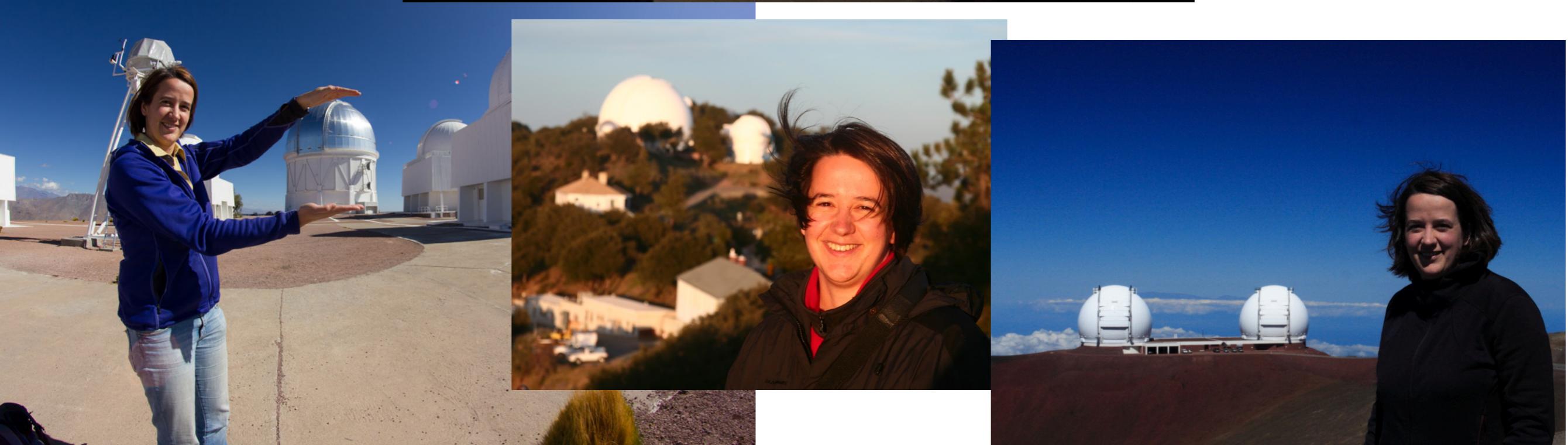
Hello!

I am an observational cosmologist with a focus on galaxy clusters and weak gravitational lensing



NASA

# Big telescopes!



# My Bio



T.Wolf



unknown

undergrad:

University of Bonn

PhD:

Max-Planck-Institute for Astrophysics, Garching

post-docs:

Stanford University

Tycho Brahe Fellow, Stanford + Copenhagen

since Dec. 2015: faculty at SBU



Stanford U



N.Amorisco

# How I got interested in astronomy



I 1990s:  
Bayer moved my  
Dad+family to  
SE Texas  
  
skies were dark,  
nights were  
warm, people  
were different



IAYC

International  
Astronomical  
Youth  
Camp

# 56th International Astronomical Youth Camp 2022

Eichsfelder Hütte (in-person!)  
St. Andreasberg, Germany

17th July - 6th August, 2022

Applications open until 31st March

[www.iayc.org](http://www.iayc.org) – [info@iayc.org](mailto:info@iayc.org)

## How I stayed interested in astronomy

International  
Astronomical Youth  
Camp:  
spend 3 weeks with  
~70 young people  
from all over the  
world

# Course TAs

Aaron Mueninghoff  
<aaron.mueninghoff@stonybrook.edu>

Ben Levine  
<benjamin.c.levine@stonybrook.edu>

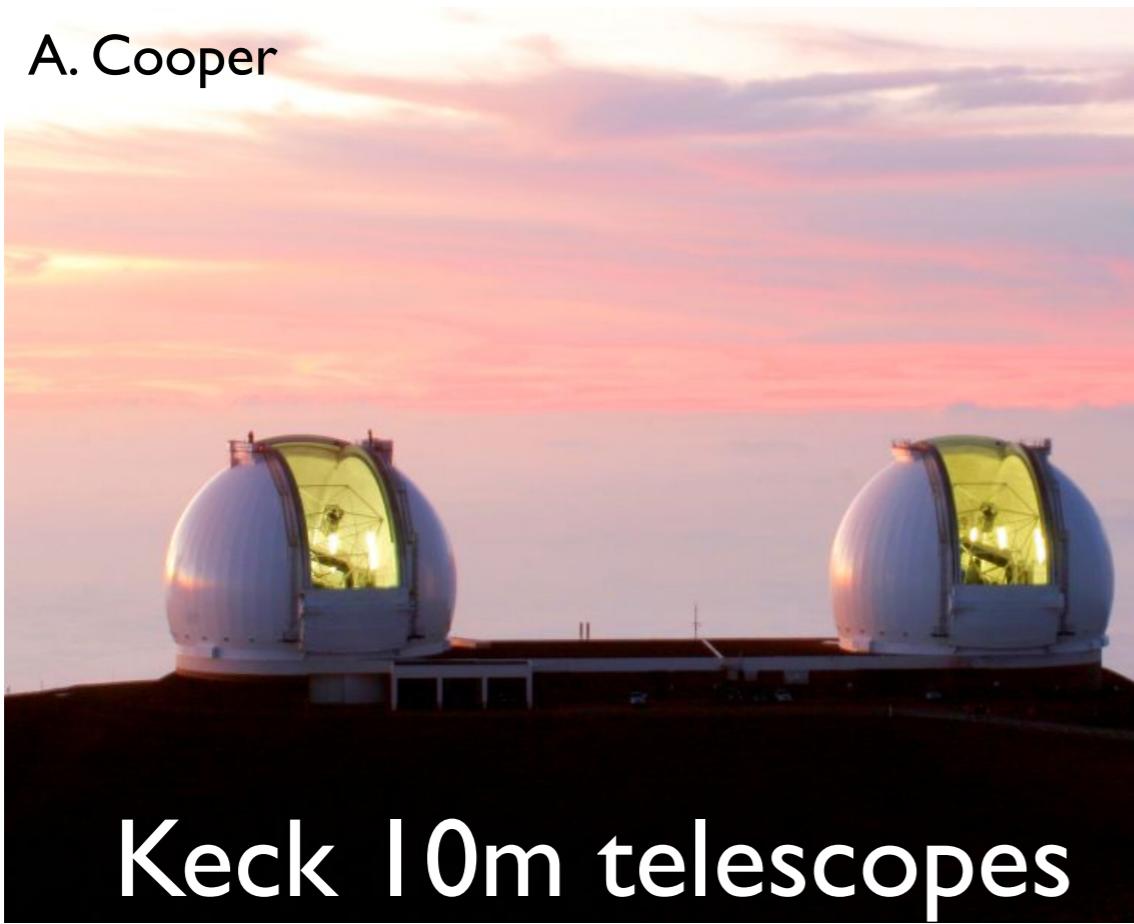
# Course Purpose

- graduate-level class (PHY 517), cross-listed for advanced undergraduates (AST 443) planning to go to grad school for astronomy
- purpose: teach you the basics of how to be an observational astronomer
- this is the *only* class at SBU with this purpose: we have a lot to cover

# Course Objectives

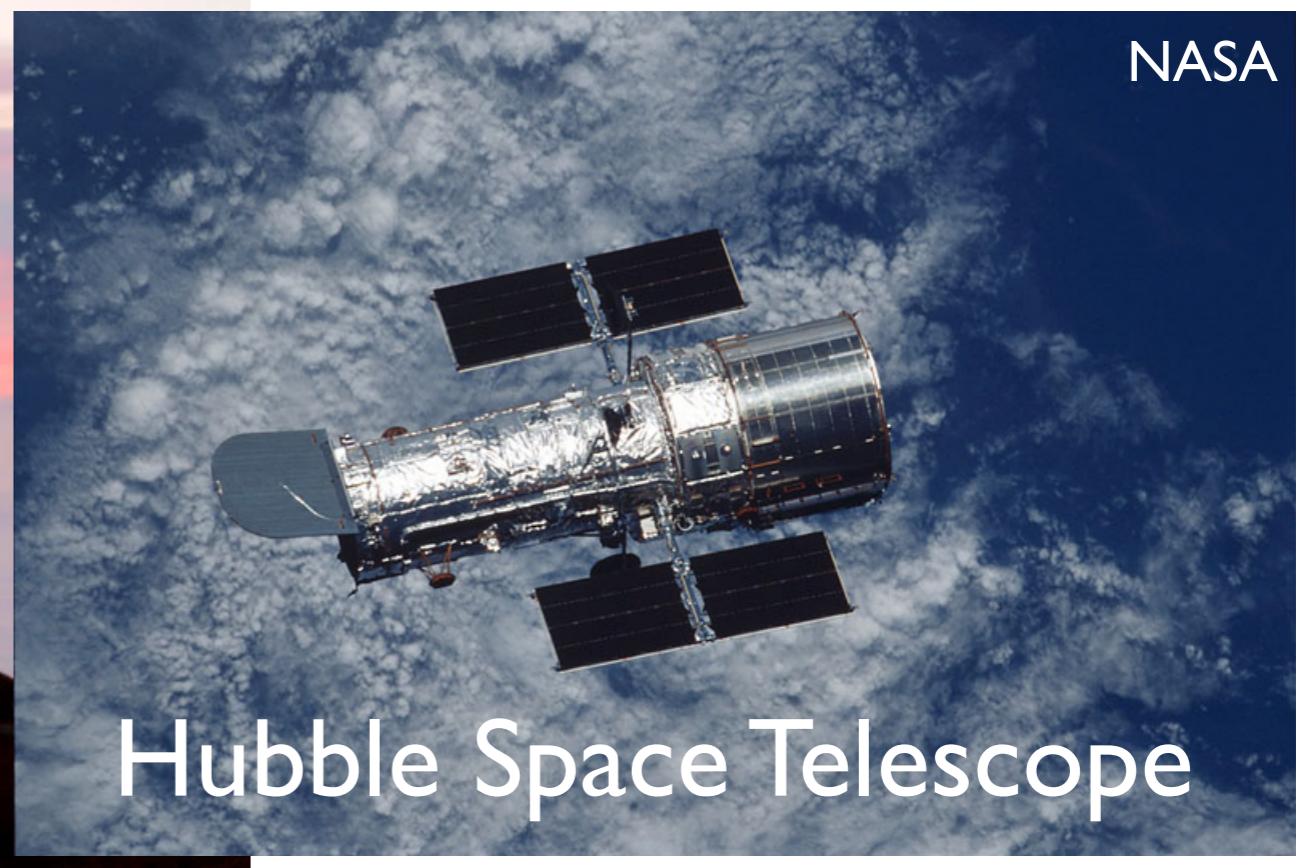
- introduction to observational astronomy
- design, take, analyze and interpret astronomical observations
- report your work in a scientific paper
- same concepts as needed for these:

A. Cooper



Keck 10m telescopes

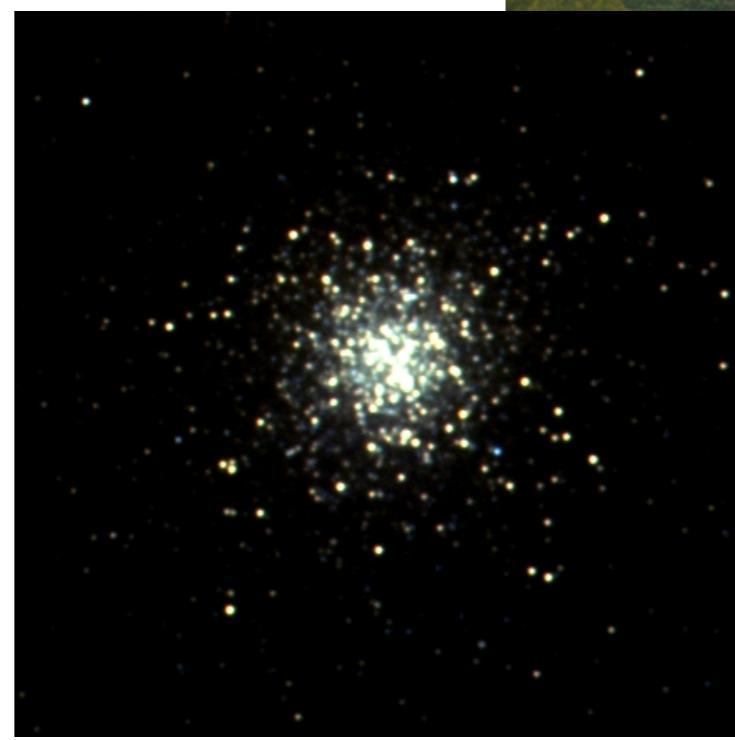
NASA



Hubble Space Telescope

# Mt Stony Brook Observatory

- roof-top dome + telescope (14-inch) + CCD camera + spectrograph



SBU Astronomy Club

# How to be an observational astronomer

1. come up with an interesting idea / hypothesis
2. search for and analyze archival observations
3. write a **telescope proposal**
4. plan and execute your **observations**
5. analyze your **data**
6. write a **journal paper**
7. present your work at conferences

# We'll deviate a bit ...

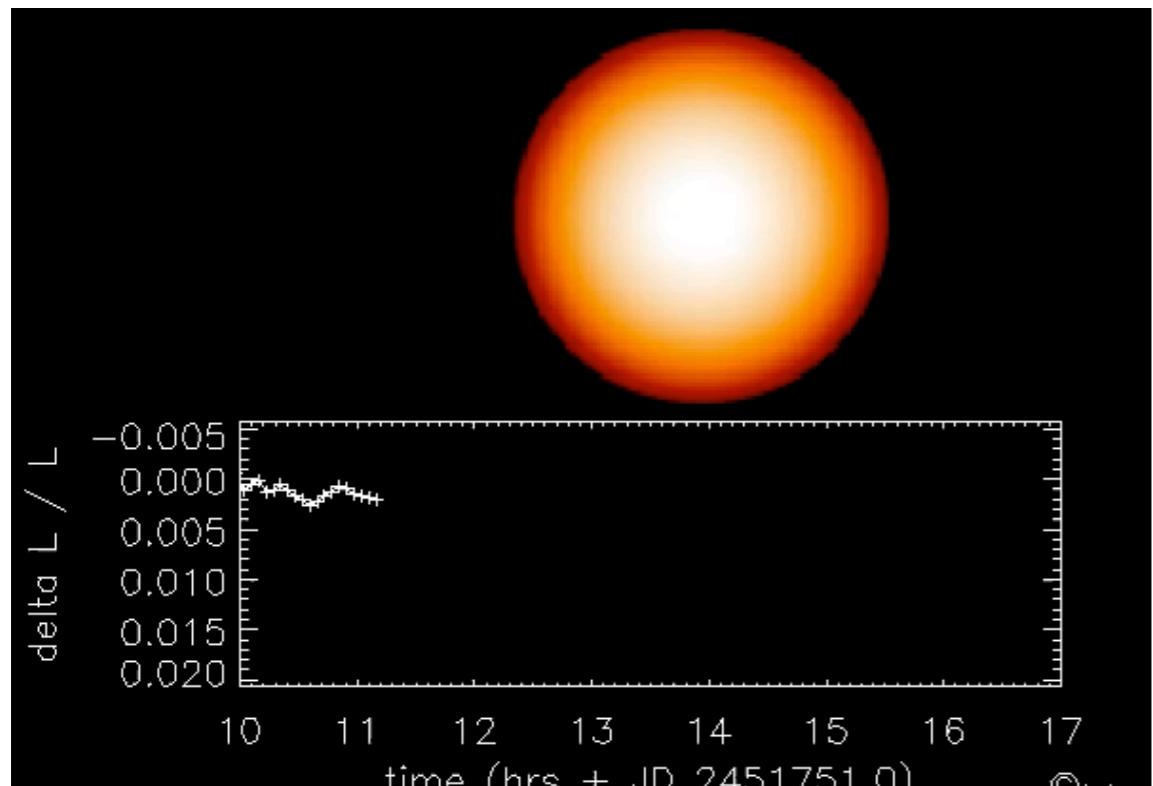
1. conduct and analyze **observations**
2. lab report → **journal paper**
3. write a **telescope proposal**
4. serve on a Time Allocation Committee (TAC)
5. **present your work in class**

# Lab 1 - CCD cameras

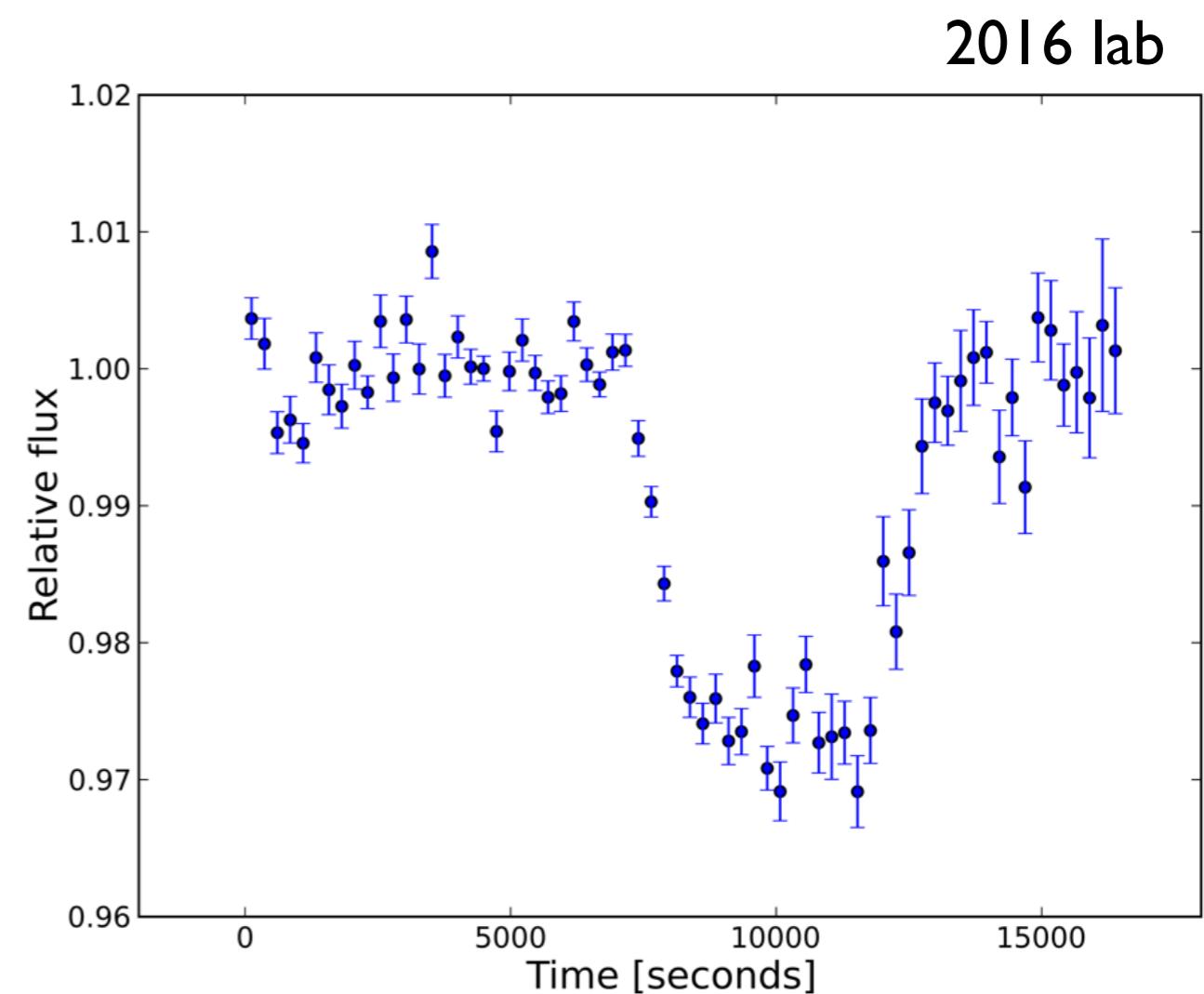
- measure properties of our CCD cameras
- understand the role of calibration data
- familiarize yourself with the equipment

# Lab 2 - optical imaging; time-series photometry

- detect an exoplanet transit

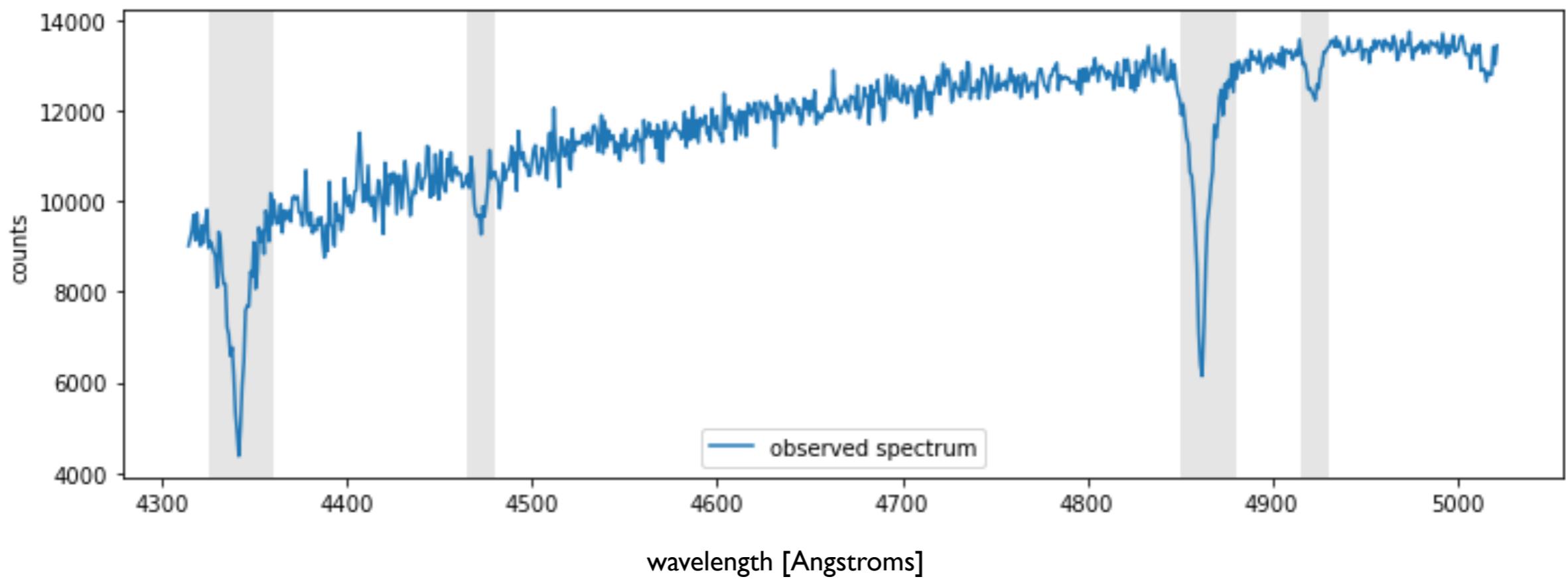


Deeg & Garrido 2000



# Lab 3 - optical spectroscopy

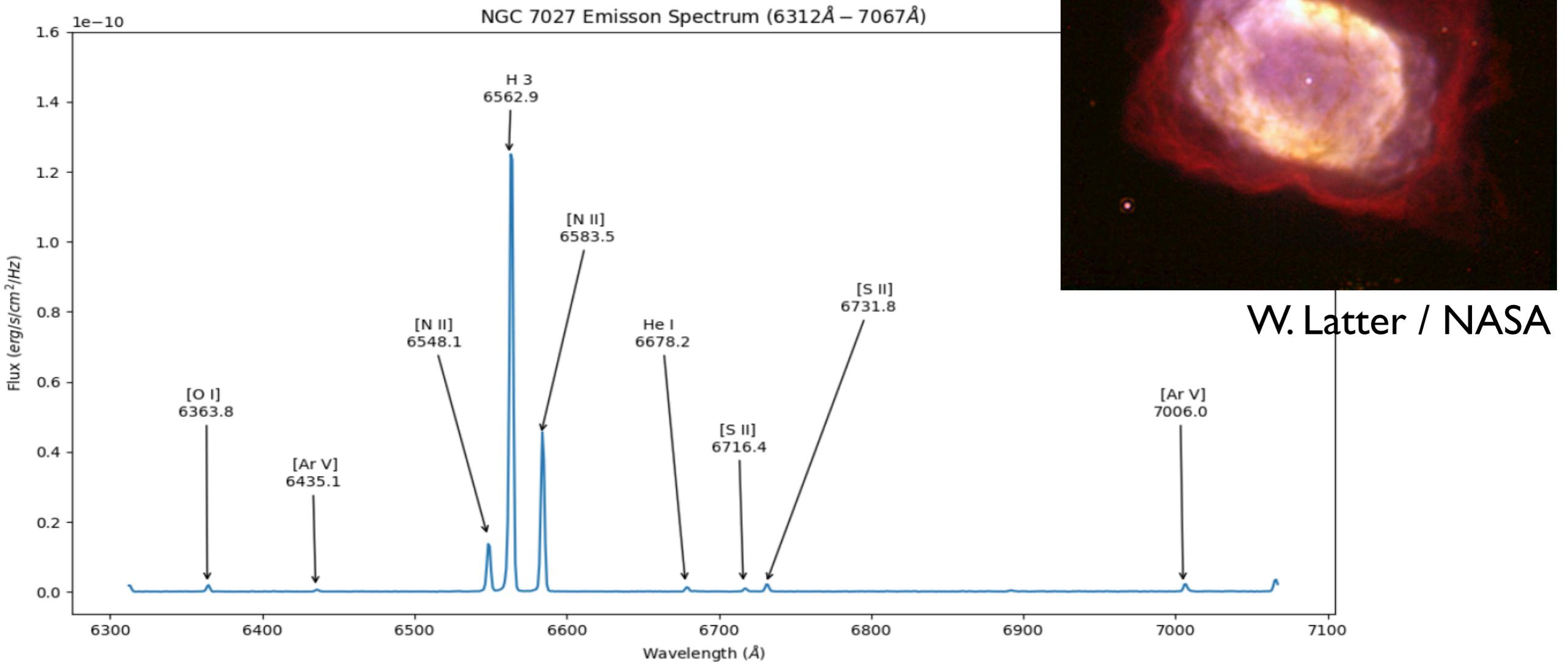
- compare spectra of stars with range of temperatures



# Lab 3 - optical spectroscopy

- OR: measure the gas temperature of a gaseous nebula

2017 lab

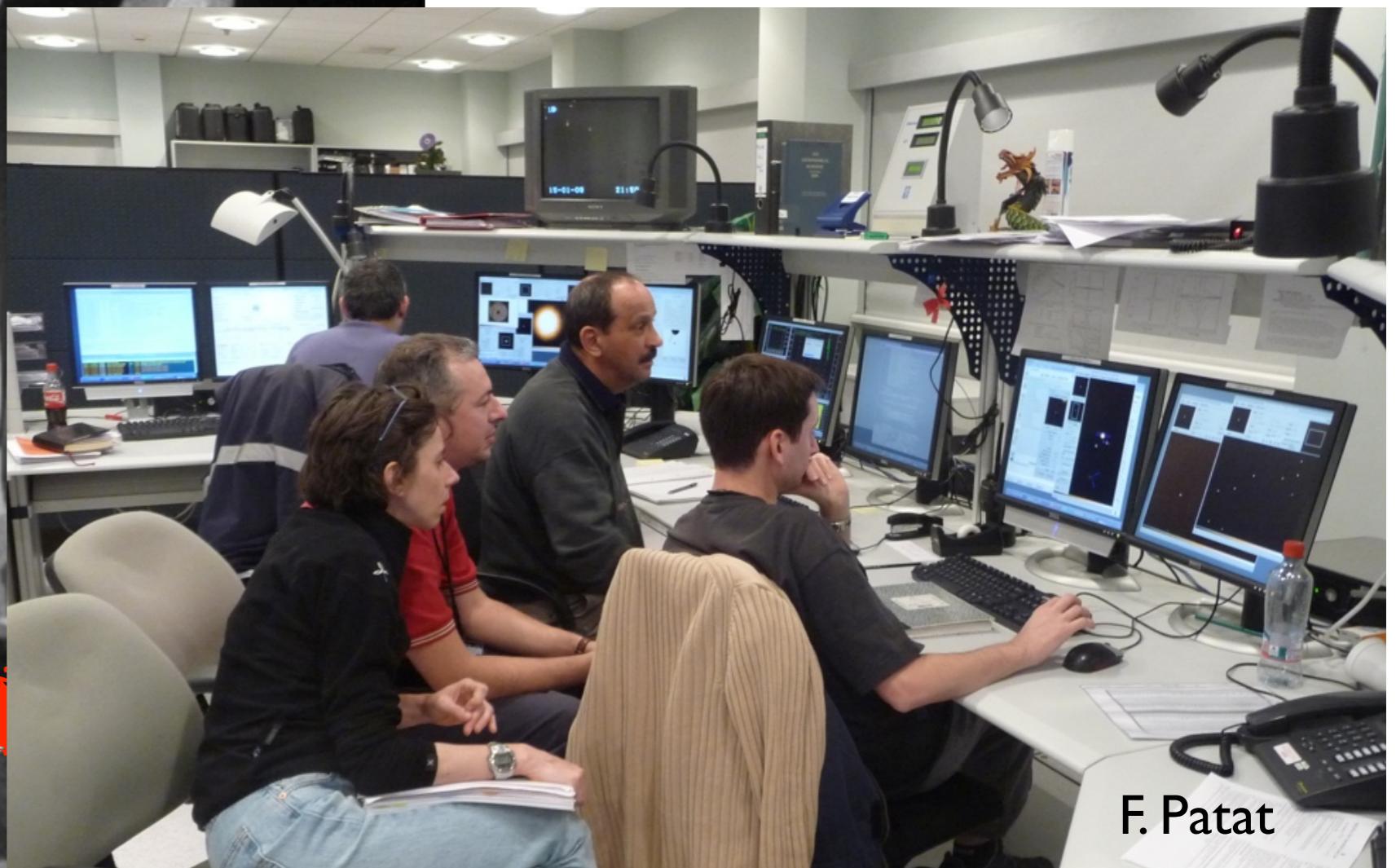


# Lab 4 - your proposal

- come up with your own project idea, write a telescope proposal for the Mt. Stony Brook telescope
- we will hold a Time Allocation Committee - just like real astronomers!
- each lab team will conduct their top-ranked project

# Data analysis

astronomy ~100 years ago:



astronomy today:

Mt. Wilson archive

# Data analysis

- CCD cameras and digital image processing were revolutionary for astronomy
- first CCD cameras used on telescopes ~1980
- the Sloan Digital Sky Survey (SDSS), designed in the 90s, was one of the first “Big Data” projects; today we are preparing for the Rubin Observatory’s Legacy Survey of Space and Time (LSST), ~20 TB per night, every night for 10 years
- *research in astronomy requires programming, and statistical analysis of large datasets*

- we will use several common astronomy software packages:
  - Source Extractor
  - ds9
  - ~~pyraf / iraf~~
  - astrometry.net
  - FTOOLS
- most astronomy research is done on Unix / Linux. bash provides an integrated scripting language
- python is becoming ubiquitous in astronomy as higher-level programming language
- however, this is not a class on programming. we will provide basic instructions and help, but you will have to figure out many things on your own (google is your friend!)

# Computing Resources

- all necessary software is installed on two machines in the Astro Computing Lab (uhura and vulcan)
- you can work in the Lab, and/or you can **ssh** into these machines from your laptop
- you will receive a username and password (valid for all computers in the lab); please change your password - make it complex!
- **keep your password safe!** our computers are under constant attack
- **back up your data!** e.g. google drive. minimum: your raw data, scripts to analyze the data, data that you used for final plots

# Class structure

## Class times:

- Mon + Wed 2:40-5:30pm
- ~6 lectures in the beginning
- other sessions: tutorials / data analysis help sessions
- Proposal deadline: Oct. 12
- Time Allocation Committee: Oct. 19
- Final Presentations: Nov. 30 + Dec. 5

# Class structure

## Data taking:

- scheduled **separately from class time**
- Lab 1: day-time
- Labs 2+3 - observational labs: **evenings / nights**; you need good weather → schedule target night + 2 back-up nights for each lab
- Lab 4 - observational lab (presumably night-time), details depend on your project

*It is essential that you get your data - you will need to be flexible about scheduling night-time observations!*

# Course webpage: [https://github.com/anjavdl/PHY517\\_AST443](https://github.com/anjavdl/PHY517_AST443)

Code Issues 5 Pull requests Discussions Actions Projects Wiki Security Insights Settings

## Home

anjavdl edited this page 2 days ago · 32 revisions

Edit

New page

### General Information

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Class time and place: MoWe 2:40 - 5:30pm, ESS 450

Credits: 3 (PHY 517) or 4 (AST 443)

Instructor: Anja von der Linden (anja.vonderlinden 'at' stony brook.edu, ESS 453)

Office hours: TBD

TAs:

- Aaron Mueninghoff (aaron.mueninghoff 'at' stonybrook.edu), office hours TBD, ESS 457A or by appointment
- Ben Levine (ben.c.levine 'at' stonybrook.edu), office hours TBD, ESS 457A or by appointment

Suggested texts:

- Measuring the Universe, G. Rieke (Cambridge University Press, 2012)
- Data Reduction and Error Analysis for the Physical Sciences, P.R. Bevington & D. K. Robinson (McGraw-Hill Higher Education, 2003)
- Practical Statistics for Astronomers, J.V. Wall & C.R. Jenkins (Cambridge University Press, 2008)

Prerequisites: AST203 (Astronomy), PHY277 (Computation for Physics and Astronomy), WRT102 (Intermediate Writing Workshop)

Class times will be scheduled either as lectures, tutorials, or data analysis help sessions, i.e. the possibility to work on the data analysis in the presence of the instructor / the TAs. In addition, the labs need to be scheduled with the TAs. Lab 1 is to be completed during day-time, independent of the weather. For Labs 2, 3, and 4, expect to schedule 3 night-time observing sessions each - you need to be flexible for the weather!

#### General Information

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- [Schedule w/ links to slides, HW, etc.](#)
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- [Academic Policies](#)

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- [Observing Equipment](#)
- [Observing Calendar](#)
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- [jupyter](#)

# Schedule Fall 2022

anjavdl edited this page 2 days ago · 5 revisions

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Date	Topics	Slides	Tutorials	Homework
Aug 22	Intro, Coordinate Systems	[Lecture 0], [Lecture 1]		[HW1, due Aug 24]
Aug 24	Time, Magnitudes, Atmosphere, Telescopes	[Lecture 2]	[Tu1]	[HW2, due Aug 31]
Aug 29	CCDs, FITS files	[Lecture 3]	[Python 1], [Python 2]	
Aug 31	Statistics 1	[Lecture 4]	[Tu4]	[HW3, due Sep. 12]
Sep 5	<i>Labor Day - no class</i>			
Sep 7	Statistics 2	[Lecture 5]		
Sep 12	Spectroscopy	[Lecture 6]		[HW4, due Sep. 19]
Sep 14	Data Analysis Help Session			
Sep 19	Data Analysis Help Session		[Tu5]	
Sep 21	Instructions: Proposal Writing	[Lecture 6], [wiki link]		
Sep 26	Data Analysis Help Session			
Sep 28	Data Analysis Help Session			

Lecture notes, etc. will  
be linked from schedule

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## General Information

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- Astronomical Data Archives
- Weather
- End-of-night report

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- awk and sed
- LaTeX
- Python
- ipython



# Observing Equipment

anjavdl edited this page on Feb 28 · 9 revisions

[Edit](#)[New page](#)

## Mt. Stony Brook 14-inch telescope

Our Department operates the Mt. Stony Brook observatory, housing a 14-inch Meade LX200-ACF telescope on a Mesu-200 German Equatorial Mount. This will be the workhorse telescope for the imaging and spectroscopic components of the course.

### [Step-by-step instructions](#)

[Telescope manual](#)

[Mesu mount Set-Up Instructions](#)

[SiTech Controller Manual](#)

The mount has GoTo functionality through the software [Cartes du Ciel](#).

## CCD camera for imaging

Imaging observations with the 14-inch telescope will be taken with the SBIG STL-1001E CCD camera. The CCD camera is mounted on the back end of the telescope and is controlled through a laptop computer. A set of standard broad-band BVRI and a narrow-band H-alpha filters are available.

[STL-1001E spec sheet](#)

[CCDS soft step-by-step instructions](#)

[Operations manual](#)

[CCDS soft manual](#)

## Spectrographs

We have two DADOS spectrographs; one has the low-resolution grating (200 l/mm) installed, the other the high-resolution grating (900 l/mm).

[Step-by-step instructions](#)

[Spectrograph manual](#)

[Tutorial by B. Koch](#)

# Manuals etc. for all observing equipment

[Pages 37](#)

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- [Python](#)
- [jupyter](#)
- [GitHub](#)

# Observing Calendar

Anja von der Linden edited this page on Aug 15, 2017 · 2 revisions

# Observing Calendar

Edit

New Page

Can be found [here](#).

▶ Pages 35

## Mt Stony Brook Observing Calendar

Today ◀ ▶ September 2022 ▾

The calendar shows the following events:

- Sep 1: 7pm Open Night
- Sep 8: No observing
- Sep 9: Full Moon

Events shown in time zone: Eastern Time - New York + Google Calendar

### General Information

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### Labs and Write-Ups

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- Lab 3: Diffuse Nebula Spectroscopy
- Lab 4: Your own proposal
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- Astronomical Data Archives
- Weather
- End-of-night report

### Computing

- Computing Resources
- Astro Software Overview

## CCD Lab

# Lab Instructions

Edit

New Page

anjavdl edited this page on Jan 26, 2021 · 2 revisions

### Experiment Description:

[https://github.com/anjavdl/PHY517\\_AST443/blob/master/ccd\\_lab/ccd\\_lab.pdf](https://github.com/anjavdl/PHY517_AST443/blob/master/ccd_lab/ccd_lab.pdf)

### Equipment Quick-Start Instructions:

[Telescope](#)

[CCDSof](#)

[Spectrograph](#)

### Preparation:

Schedule your data acquisition with the TAs. The lab takes about 3-4h. **Make sure to read and understand all of the instructions linked above before the lab!** You will be quizzed on the concepts that the lab conveys.

Moreover, good preparation will allow you to complete the lab faster. *If you are not adequately prepared, you will have to reschedule the lab, and will receive a grade penalty.*

+ Add a custom footer

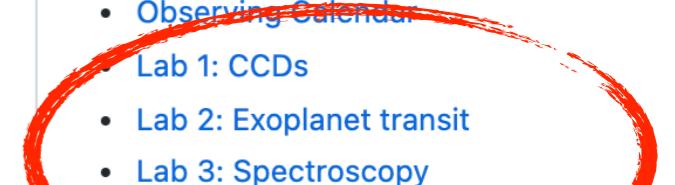
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- [Observing Calendar](#)
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- [Lab 2: Exoplanet transit](#)
- [Lab 3: Spectroscopy](#)
- [Lab 4: Your own proposal](#)
- [~~Discontinued: Radio Interferometry~~](#)
- [Astronomical Data Archives](#)
- [Weather](#)
- [End-of-night report](#)



# Computing Resources

anjavdl edited this page 2 days ago · 22 revisions

## The Astro Student Computing Lab

Data analysis sessions and tutorials will take place in the Astro Computing Lab in ESS. You will receive an envelope with your username and password to these computers at the beginning of the course. Three of these computers have special roles: `uhura` and `vulcan` are the two (relatively powerful) machines on which all the astronomy software is installed - these are the computers on which you are encouraged to run your data analysis scripts, especially those working on the raw image files. `kirk` is the central server. Note that none of these three is physically accessible. All the other machines (`spock`, etc.) are mainly there to let you log onto `uhura` / `vulcan` / `kirk` remotely; but you can choose to use your own laptop to do so instead (see instructions below). There are enough computers so that every group can use one, but not enough for all students, so please bring your laptop if you have one.

The computers in the Astro Computing Lab all run Linux, with which you should be familiar from PHY 277. If you are a bit rusty on your Linux command line skills, you may find a "cheat sheet" such as [this one](#) useful.

### Your log-in

You will receive either an e-mail, or a sheet of paper with your username and initial password. **Do not give this paper to anybody else, or leave it lying around.** With this account, you can log into any computer in the computing lab, directly or remotely (remote access is described below). Your first action should be to change your password (see below).

### When using the astro lab computers in person

The fastest (and recommended) desktop manager on our systems is `MATE`. To select it, click on the

# Astro Computing Cluster Instructions

Computing

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- [jupyter](#)
- [GitHub](#)
- [ds9](#)
- [SExtractor](#)
- [Topcat](#)
- [Astrometry.net](#)
- [dfits and fitsort](#)
- [Image arithmetic \(+ftools\)](#)

Specific  
software  
descriptions

# Home

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## General Information

Class time and place: MoWe 2:40 - 5:30pm, ESS 450

Credits: 3 (PHY 517) or 4 (AST 443)

Instructor: Anja von der Linden (anja.vonderlinden 'at' stony brook.edu, ESS 453)

Office hours: TBD

TAs:

- Aaron Mueninghoff (aaron.mueninghoff 'at' stonybrook.edu), office hours TBD, ESS 457A or by appointment
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Prerequisites: AST203 (Astronomy), PHY277 (Computation for Physics and Astronomy), WRT102 (Intermediate Writing Workshop)

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# Homework reading until Wednesday

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## Labs and Write-Ups

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  - Observing Equipment
  - Observing Calendar
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- LaTeX
- Python
- jupyter

● ○ ●

← → ⏱

Search PHY517 / AST443 Spring 2021

①

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PHY517 / AST443 Spr...

Threads More Channels

# computing\_other  
# general  
# latex  
# lectures  
# python  
# random

+ Add channels

Direct messages

Slackbot  
anja.vonderlinden you  
K\_o Kedarsh Kaushik  
K\_2 Kedarsh Kaushik, Radhakri...  
R Radhakrishnan Srinivasan

+ Add teammates

+

#random ★

Add a topic

R K 3 + Add i

# Outside of class, we will use slack for communication - look for an invitation in your e-mail inbox

You've found the #random channel

This channel is for... well, everything else. It's a place for team jokes, spur-of-the-moment ideas, and funny GIFs. Go wild!

Edit description

Wednesday, January 27th

anja.vonderlinden 8:23 PM joined #random along with 2 others.

Today

anja.vonderlinden 9:27 PM Did you know about **Astronomy Picture of the Day?** <https://apod.nasa.gov/apod/astropix.html>

apod.nasa.gov  
**Astronomy Picture of the Day**  
A different astronomy and space science related image is featured each day, along with

# Best way to keep track of slack: install the App on your computer

Aa @ 😊 🌟 >

Search PHY517 / AST443 Spring 2021

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PHY517 / AST443 Spr...

Threads

More

Channels

# computing\_other

# general

# latex

# lectures

# python

# random

+ Add channels

Direct messages

Slackbot

anja.vonderlinden you

Kedarsh Kaushik

Kedarsh Kaushik, Radhakri...

Radhakrishnan Srinivasan

+ Add teammates

#random

Post questions about lectures, computing, etc. in the relevant “channel”. Try to answer your classmates’ questions!

You've found the #random channel

This channel is for... well, everything else. It's a place for team jokes, spur-of-the-moment ideas, and funny GIFs. Go wild!

Edit description

Wednesday, January 27th

anja.vonderlinden 8:23 PM joined #random along with 2 others.

Today

anja.vonderlinden 9:27 PM Did you know about Astronomy Picture of the Day? <https://apod.nasa.gov/apod/astropix.html>

Send private messages to your teammates, the instructor, the TAs.

B I

Aa @

# Team work

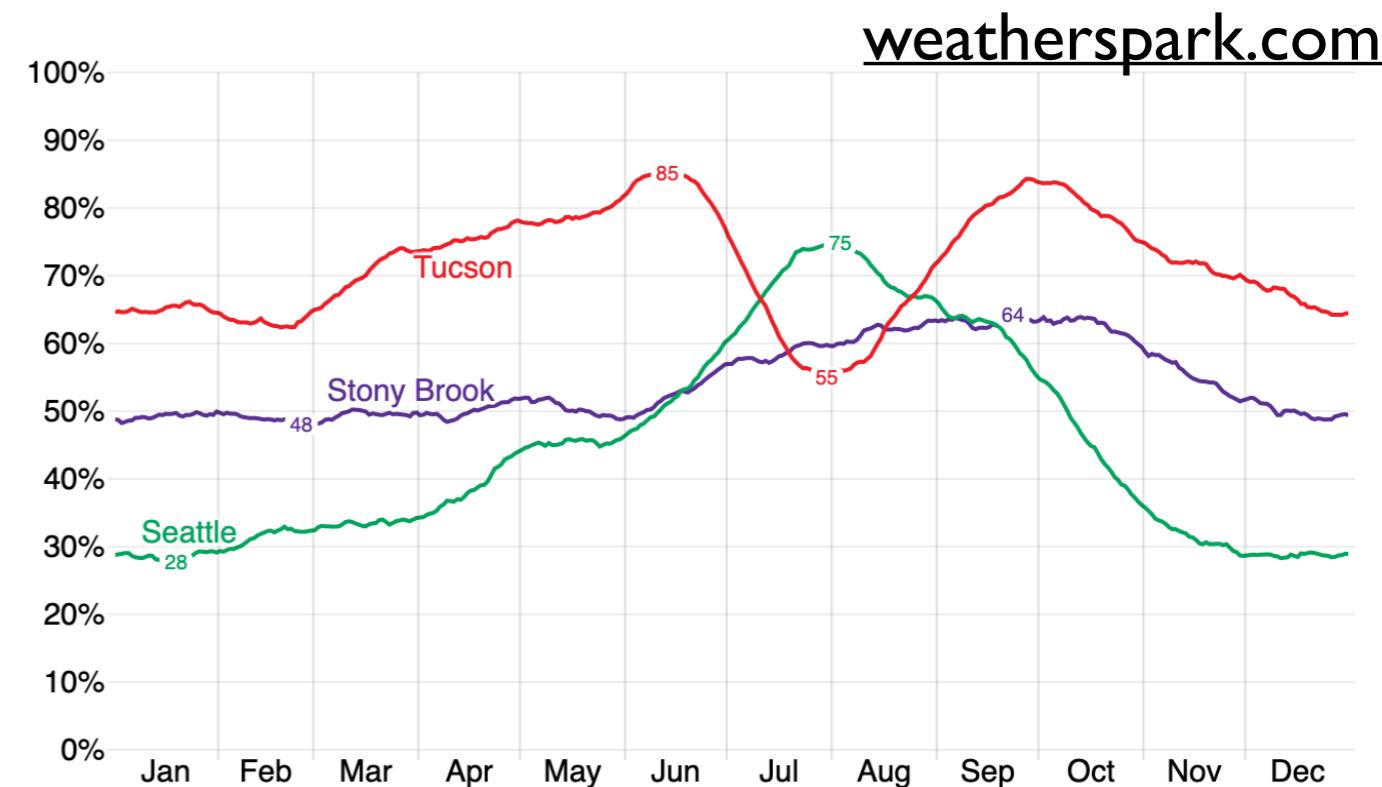
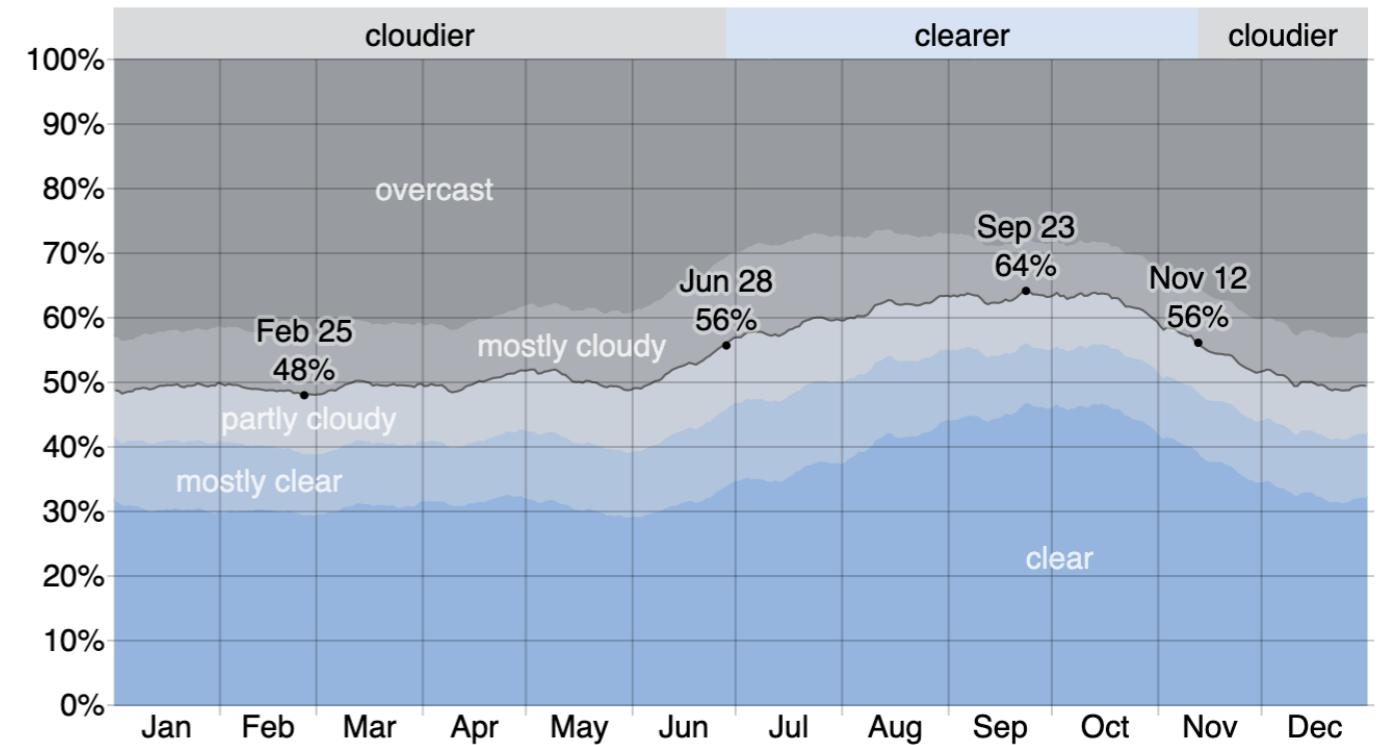
- observational astronomy is done in teams
- for the labs, you will observe in **teams of 2 or 3**
- you are highly encouraged (and expected) to work together on the data analysis
- everybody has to submit individual lab reports (however, proof-reading each other's reports is encouraged)
- I will assign teams based on these criteria:
  - the preferences you submitted
  - weeknight availability
  - diversity: grad / undergrad, Honors / Scholars / WISE, astronomy background, programming background, gender, race, etc.

# (Night-time) observing

- a TA or instructor must be present (or in the building)
- please plan your observations to be done by ~ 1-2 am
- familiarize yourself with the instructions: **you will be quizzed at the beginning**
- bring:
  - WARM clothes!
  - a red flash-light / rear bike-light
  - a USB key to take your data home
  - all materials needed for the lab: instructions (printed!), finding charts (printed!), your notebook etc.
  - cookies / chocolate

# Weather

- biggest problem: clouds are really, really hard to predict!!!
- if there is a chance that you can get your data, you need to take that chance
- often, cannot decide to cancel until the afternoon
- sometimes, we will make the wrong decision...



# Weather

anjavdl edited this page on Mar 6, 2021 · 4 revisions

[Edit](#)[New Page](#)

## Current conditions:

GOES-East loop: [https://www.star.nesdis.noaa.gov/goes/sector\\_band.php?sat=G16&sector=ne&band=GEOCOLOR&length=24](https://www.star.nesdis.noaa.gov/goes/sector_band.php?sat=G16&sector=ne&band=GEOCOLOR&length=24)

Radar + clouds animation from weather.com: <https://weather.com/weather/radar/interactive/l/USNY1412:1:US?layer=radarclouds&animation=true&zoom=7>

Webcam: <http://wx.somassbu.org/DATA/HSC/WX-HSC.php>

## Forecasts:

Calsky: <https://www.calsky.com/cs.cgi?obs=72599379422991&Meteo=>

Clear Dark Sky for Mt. Stony Brook: <http://www.cleardarksky.com/c/MtStnyBrkObNYkey.html?1>

Windy: <https://www.windy.com/40.926/-73.141?clouds,40.451,-73.141,7,m:eNnad7g>

4 models: ECMWF, GFS, NEMS, NAM  
~~\_\_\_\_\_~~ ~~\_\_\_\_\_~~ ~~\_\_\_\_\_~~

Ventusky: <https://www.ventusky.com/?p=40.92;-73.15;6&l=clouds>

4 models: GFS, ICON, GEM, HRRR ~~\_\_\_\_\_~~

Pages 35

### General Information

- Syllabus
- Schedule w/ links to slides, HW, etc.
- Grading
- Academic Policies

### Labs and Write-Ups

- Guidelines
- How to write a decent lab report
- Observing Equipment
- Observing Calendar
- Lab 1: CCDs
- Lab 2: Exoplanet transit
- Lab 3: Spectroscopy
- Lab 4: Your own proposal
- Discontinued: Radio Interferometry
- Astronomical Data Archives
- Weather ~~\_\_\_\_\_~~
- End-of-night report ~~\_\_\_\_\_~~

+ Add a custom footer

Long-term forecast models: ECMWF, GFS

Short-term forecast models: NAM, HRRR

# End-of-night report

- when observing, it is imperative that you let the daytime crew (i.e me) know how the observations went ASAP
- fill out the end-of-night report (linked from wiki) at the end of your observations
- if there were problems, describe them in detail

How much time was lost due to clouds? \*

- 0%
- <25%
- 25-50%
- 50-75%
- >75%

How much time was lost due to technical issues? \*

- 0%
- <25%
- 25-50%
- 50-75%
- >75%

Describe any technical issues you encountered.

Your answer

Other comments

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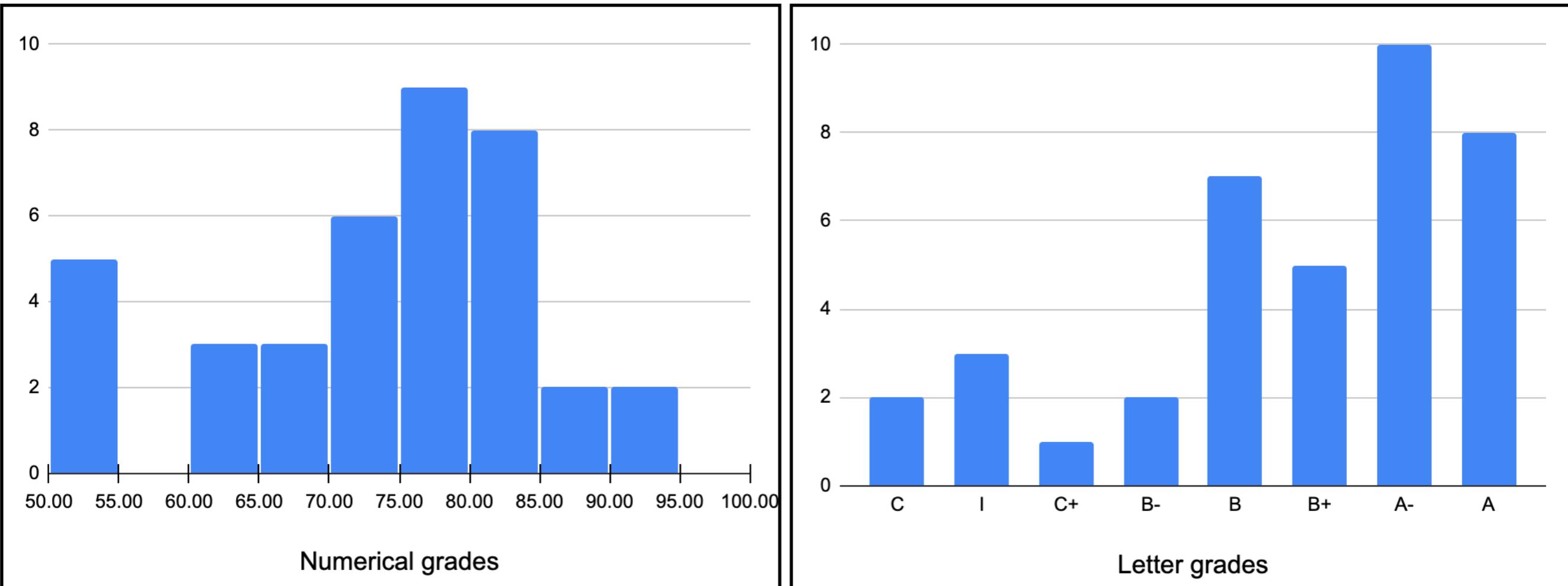
# Note

- you are responsible for your own transportation home after observing
- please do not ask the TAs for a ride home! they have to be here way more nights than you, and are also taking classes
- if you live on campus, you can request a walk escort / ride home: <https://www.stonybrook.edu/campus-safety/#view-residential-safety>

# Grading

- 15% lab 1 - lab report as jupyter notebook
- 20% lab 2 - lab report as journal paper
- 15% lab 3 - lab report as jupyter notebook
- 20% lab 4 - lab report as journal paper
- 10% project proposal + evaluation of peer proposals
- 10% final presentation
- 10% homeworks + participation in discussions

# Grading



(Undergraduate grades only)

# Blind Grading

- Lab reports, proposals and homeworks will be graded blindly.
- Put only your SBU ID as author name, and the SBU IDs of your lab-mates as co-authors.

# Attendance

- Attendance is mandatory
- Absences can be **excused** e.g. when you are feeling ill and/or in isolation
  - let me know beforehand
  - take a Covid test for symptoms
  - will arrange zoom call-in as fitting
- **Unexcused** absence from lecture, tutorial or data analysis session: 1 grade point (out of 100) penalty on final grade
- You can miss 2 non-consecutive data analysis sessions without penalty (**but need to let me know**)
- **Unexcused** absence from Time Allocation Committee / final presentation: forfeit of participation points
- **Unexcused absence from your scheduled observations:** 50% penalty on lab report grade

# Scientific Writing

- Writing is ~50% of the job of a scientist!
- Labs 2 and 4, proposal: in style of scientific papers
- make sure you know how to write a scientific article!
- read scientific papers to see examples
- guidelines on wiki

# Significant digits

Code output with way  
too many digits:

$$99.123456789 \\ \pm 0.004556789$$

Round the uncertainty  
to one (or two) digits:

$$0.00455679 \rightarrow 0.005$$

The location of this  
digit tells you the  
location of the last  
significant digit:

$$99.123 \\ \pm 0.005$$

Voila:

$$99.123 \pm 0.005$$

# Lab Reports

- every lab comes with weekly deadlines to show us your progress / hand in your report
- e.g. Lab 1: report due 3 weeks after observations
- late penalty: for every day the data analysis check-in / the report is late, the final grade is multiplied by 0.95
- Example:
  - Initial grade of 80%
  - One day late:  $0.80 \times 0.95 = 0.76$
  - Two days late:  $0.80 \times (0.95)^2 = 0.72$
  - Three days late:  $0.80 \times (0.95)^3 = 0.69$
  - One week late:  $0.80 \times (0.95)^7 = 0.56$
  - Two weeks late:  $0.80 \times (0.95)^{14} = 0.39$

# Delay Days

- Occasionally it's just really hard to meet a deadline...
- Everybody gets 7 “delay days” at the beginning of the course
- You can trade in delay days to avoid late penalties (for lab reports and data analysis check-ins, NOT proposals / presentations)
- For data analysis check-ins, delay days have to be used as a group (everybody “spends” a delay day)
- For lab reports, delay days can be used individually

# Keeping track

For each group, we will set up a google sheet to track your lab dates, deadlines and delay dates

	A	B	C	D	E	F	G	H
1	Lab	Observations	Deadlines		Observer	SBU ID	Delay Days	Class absences
2								
3	Lab 0	2018-09-06	2018-09-13				1	3
4			2018-09-20				0	2
5			2018-09-27				0	1
6								
7	Lab 1	2018-10-01	2018-10-18					
8		2018-10-09	2018-10-25					
9		2018-10-11	2018-11-01					
10			2018-11-08					
11								
12	Lab 2	2018-11-01	2018-11-15					
13		2018-11-06	2018-11-22					
14		2018-11-08	2018-11-29					
15			2018-12-06					
16								
17	Lab 3	2018-10-24	2018-11-21					
18		2018-11-12	2018-11-28					
19		2018-11-14	2018-12-05					
20			2018-12-12					

# Plagiarism

- Any incidence of plagiarism will automatically result in a final grade of “Q” (Academic Dishonesty).
- Examples of plagiarism specific to this course:
  - Copying parts of somebody else's lab report verbatim
  - Copying parts of somebody else's lab report, slightly modifying each sentence
  - Copying somebody else's observing proposal
  - ...

# Plagiarism

- The first “Q” grade means:
  - You lose your scholarship
  - Class penalty ranges from an “F” for the assignment to an “F” in class
  - You have to enroll in a special class (the “Q” class), otherwise the “Q” will become an “F”
- Full policy available at [https://www.stonybrook.edu/commcms/academic\\_integrity/policies\\_procedures/index.php](https://www.stonybrook.edu/commcms/academic_integrity/policies_procedures/index.php) and [https://www.stonybrook.edu/commcms/academic\\_integrity/students/faq.php](https://www.stonybrook.edu/commcms/academic_integrity/students/faq.php)

# “This class sounds tough...”

- This course was, by far, the best laboratory I have ever taken at Stony Brook. It is one of the best courses I have taken period. In only one semester, I was able to meaningfully participate in the scientific process in a way that was engaging, rigorous, educational, and purposeful. I learned about python, astronomical equipment, the astronomical bodies I studied, how to write research proposals, how to write scientific papers etc. The list goes on and on.
- This course offers immense value to students with a desire to pursue academic research in the field of Astronomy. This course was difficult, time consuming, and the instructor has very high expectations of her students, which are merited. If we want to pursue research, fundamental skills must be developed. It was nice to be challenged, and I feel strongly that this course helped me improve as a student.
- It gave a sneak peek into the life of an astronomer.
- This is an extremely valuable class for astronomy students interested in going into research. It's really impressive that we were able to use legitimate equipment, targets, and techniques that real observers would use. It's rare that an undergraduate class would give this much real-world experience.
- I learned a lot in this course. The student is responsible to figure out how to do most everything in this class especially when analyzing data from lab experiments and this really prepares students to go into graduate school and into research as an astronomer. I improved my skills in coding, LaTeX, and writing scientific papers in this course. The TAs were very helpful during lab experiments.
- I appreciated that each report covered an area of astronomy very well. Putting in the effort, you can learn the relevant softwares/computing techniques used throughout the course associated to each topic. I also gained much deeper understandings of astronomy techniques, such as how an exoplanet light curve is constructed from just a series of images.
- I learned hands on observational astronomy techniques, I improved my writing skills and I also strengthened my coding skills. What makes this course so valuable is that the experiences I had in class will provide me with useful skills in my career.
- This course gave me a nice insight into the observational world of Astronomy. This was the first time i have been able to get hands on experience with observations.

# Speaking of workload

- There's a lot of work to be done... 4 labs + reports, proposals + evaluations, final presentations
- It is unavoidable that **you will be working on more than one assignment at a time**
- The weekly analysis check-ins are meant to help you by dividing the work into manageable chunks
- Start scheduling your observations as early as possible to avoid too much work pile-up!
- By spacing out what needs to be done. At one point, we had to hand in a fully finished lab report, a data analysis check in of another lab, and had to observe for the third lab all in the same week. This class is extremely labor intensive and you will end up doing most of the things last minute because of other classwork.



Avoiding this situation is  
your responsibility!

# Again...

- this is NOT an “easy” class to avoid the physics lab!
- you will have to work hard
- you will have to figure out things on your own
- this class will challenge you
- ... for many of you, it will be the closest thing to actual research that you have encountered so far

# Undergrad Writing Requirement

## From undergrad bulletin:

### E. Upper-Division Writing Requirement:

Students are certified as satisfying the upper-division writing requirement by registering for the 0-credit [AST 459](#) and completing writing projects within their major. All students majoring in Astronomy/ Planetary Sciences must submit two papers (term papers or independent research papers) to the Astronomy coordinator for Department evaluation by the end of the junior year. If this evaluation is satisfactory, the student will have fulfilled the upper- division writing requirement. Papers should be written in the form of a journal article. All papers must consist of an abstract, introduction, main content, and references. References should be cited throughout the text. Any figures should be numbered and have an appropriate caption. If you are using a lab report for the basis of this requirement, you should expand upon the introduction and describe the connection to topical scientific research.

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The topic of the WR needs to be original, meaning that Labs 1-3 are not eligible. You're welcome to discuss with me whether your Lab 4 is suitable.

PHY writing requirement will be treated the same as AST.

# COVID

- it's still around...
- please be aware that you do not know other people's risk factors
- I plan to wear a mask when we're not social distancing (e.g. the data analysis help session), but not when upfront lecturing