PHYS 642 Project Instructions

The project component of the course consists of two projects, each worth 25% of the grade. Project 1 "Analyze something" is a chance to take a astronomical source or event that interests you and analyze the relevant radiative processes. Project 2 "Compute something" will involve a numerical calculation of the radiation from a particular astronomical source.

For both projects, the topic you choose to work on is up to you. You might want to choose something related to your research area, although avoiding your research field is a good way to broaden your knowledge and experience. Perhaps choose a new result that you see on arXiv or even in the news. If you are having difficulty finding something to work on, please come and see me for suggestions, or talk to your research supervisor or other faculty. Each person should work on something different so topics will be claimed on a first come, first served basis (this shouldn't be a problem since each broad subject area has many different aspects).

In each case, the target audience for your write-up is the rest of the class, in other words a physics graduate student who knows something about radiative processes broadly, but not about the details of your chosen topic.

Project 1: Analyze something

In this project, you should investigate a recent astrophysics result from the point of view of radiative processes. Choose a specific observation in any area of current astrophysical research in which radiative processes play role (i.e. almost any area of astrophysics!).

You should write paper (approximately 5–10 pages) in which you

- motivate why this is an interesting observation to look at – set the historical context and astrophysical context; why is this an interesting topic; why is it interesting now; what are the interesting aspects from a radiative processes point of view?

- explain the underlying radiative processes at work in the source, perhaps developing a simple model (at the level of a homework problem) to help to understand more detailed results that you find in the literature, and explain how it results in the radiation that we see from the source

- critically evaluate everything you read

You will be graded on these three areas.

When you have decided on the topic, discuss it with me and add it to this Google Sheet. *The deadline for choosing a topic is* **January 31st**. *The project is due on* **February 28th** *by email to me.*

Project 2: Compute something

In this project, the goal is to compute the radiation from an astronomical source of your choosing. Whereas the emphasis in project 1 is understanding the basic underlying physics and how it is reflected in the observed radiation, the goal in project 2 is on the computation. You can write your own code or you can use an existing code from the literature.

In your write-up (approximately 10 pages) you should

- motivate why this is an interesting type of source to look at from a radiative processes point of view

- explain the physics at work

- describe the numerical method and specifics of how you got the code to work

- critically assess the results

You will be graded in each of these areas.

When you have decided on the topic, discuss it with me and add it to this Google Sheet. *The deadline for choosing a topic is* **March 9th**. *The project is due on* **April 8th**. *You should put your write up and associated code in a github repository and send me a link by email.*