

PHY 522 – INTERSTELLAR MEDIUM

Meets: Tuesday / Thursday 11:00am – 12:20pm

Instructor: Phil Armitage

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Location: the first class will be in the assigned room STALLER CTR 3216. After that I have reserved the astronomy seminar room (ESS 450) and we will switch to that for subsequent classes.

Description: The “interstellar medium” is, literally, the gas, dust and magnetic fields that occupy the “empty space” between stars in galaxies. The goal of the class is to provide a broad introduction to the physics of the ISM, and to provide experience in research skills that are more broadly applicable (such as solving problems numerically, critically reading research literature, and giving presentations). The class is divided into four areas:

- Introduction – the basic structure and observed properties of the ISM.
- Radiative processes – how the ISM is heated and cooled, and how this gives rise to different phases.
- Hydrodynamics – including shocks and coupling to magnetic fields.
- Dynamics – how dense phases of the ISM lead to star formation.

No prior knowledge of the ISM and the dense thicket of astronomical nomenclature that surrounds it will be needed or assumed! Since this is a fairly small graduate class, the precise topics that we cover can be adjusted depending upon the class’ preferences.

Grading: final grades will be based on homeworks (60%), and short in-class presentations on relevant papers (40%). There is no final exam.

Presentations: on Thursdays, starting February 13th, we will have a 30 minute presentation / discussion of a research paper on ISM-relevant astrophysics. We’ll work in pairs for this exercise and rotate through as many times as the calendar allows.

Office hours: I am normally on campus and free between about 10am and 2:00pm on Tuesdays and Thursdays, and happy to meet at any time. Drop me an email if you want to check I don’t have another meeting scheduled before coming over. I can also meet over Zoom if you prefer.

Textbooks: no textbook **is required** for the class. I will be making use of Jonathan Williams’ recent text, which is at a fairly elementary level and I think quite suitable:

“Introduction to the Interstellar Medium” (Williams, Cambridge University Press)

Two other classic textbooks that I would recommend (both are at a more advanced level) are:

“The Physics and Chemistry of the Interstellar Medium” (Tielens, Cambridge University Press)

“Physics of the Interstellar and Intergalactic Medium” (Draine, Princeton)

There are several sets of notes from graduate ISM classes at other universities available online, some with a more observational perspective, that are worth reading.

Student Accessibility Support Center Statement

If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact the Student Accessibility Support Center, Stony Brook Union Suite 107, (631) 632-6748, or at sasc@stonybrook.edu. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and the Student Accessibility Support Center. For procedures and information go to the following website:

<https://ehs.stonybrook.edu//programs/fire-safety/emergency-evacuation/evacuation-guide-disabilities>

and search Fire Safety and Evacuation and Disabilities.

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http://www.stonybrook.edu/commcms/academic_integrity/index.html

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