

INTERSTELLAR MEDIUM

- Stefano Bovino -

Organizational aspects

About this course: Objectives

- How the ISM is organized
- How the ISM is distributed within the galaxy
- How the ISM dynamically evolves
- How stars form (very briefly)

About this course: What do we need

- 1.** Molecular Astrophysics is key to understand the ISM
- 2.** Heating, Cooling, Chemistry represents the toolbox
- 3.** Once you know the basic physics and chemistry you can go through the different phases of the ISM

About this course: Syllabus & Organization

- Overview and historical sketch of the ISM
- The Milky Way's ISM
- Collisional processes and atomic structure
- The interstellar radiation field
- The Interstellar dust
- Chemistry of the ISM
- Heating & Cooling
- Cosmic rays
- ISM Phases: Hot gas, HII regions, WNM, CNM
- Molecular clouds and SF

Slides available on
stf.astroapoyo.cl/ism.html

About this course: Textbooks

- *The Interstellar Medium* - **J. Lequeux**
- *The Physics and Chemistry of the ISM* - **A. G. G. M. Tielens**
- *Physics of the interstellar and intergalactic medium* - **B. Draine**
- *These slides: a mix of different good sources!*

About this course: Schedule

WHEN:

Mondays: 12:15-13:00

Thursdays: 15:15-17:00

Any change will be communicated in advance!

OCTOBER FREE MONTH FOR THE HOMEWORK
(See later)

About this course: Organization

- *Homework*: Paper report and discussion on classic ISM papers (in groups, we have a total of 10 papers)
- *Certamen*: on Canvas (TBD)
- Recuperación

On the Report/Presentation

Aims of this homework

Fundamental in our work is reading scientific literature!

- Learning how to perform literature research on a given topic
- Learning how to write in English in a clear and short form
- Learning how to present a scientific topic to the general public
- Practice oral English (fundamental in science)
- Develop critical skills (you have to catch the most relevant information and present to your colleagues)

The report

- In a proper PDF format and including references
- Written in correct and clear English
- Reporting the following:
 - Big picture context of the paper
 - Technical approach
 - Key findings
 - impact on subsequent work in the field (cite a recent paper that builds on this work, check on ADS)

The presentation

- Each group will lead the presentation and the discussion
- It should be clear and well explained in all its parts
- Presentation should be in English
- 15 min + 10 min. Discussion
- The students have to read the papers (all of them) and upload questions (this will be also evaluated for your final grade).
- I will create a drive or a form to post the questions with a deadline

How to work: tips

- Start reading early. Maybe more than once.
- Confusion is part of the work.
- Some of the stuff in the papers is old... so you need to go beyond that. Try to dig into literature and “google”.
- Read critically, take notes, try to understand why these papers had a big impact on the field.

About this course: Grade

- *Homework*: report + presentation/discussion (25%+25%)
- *Final exam*: 50%
- Recuperación

- Topics:

- Stromgren 1939 - <http://adsabs.harvard.edu/abs/1939ApJ...89..526S>
- Werk et al. 2014 <http://adsabs.harvard.edu/abs/2014ApJ...792...8W>
- Weingartner & Draine 2001 <http://adsabs.harvard.edu/abs/2001ApJ...548..296W>
- Sellgren 1984 <http://adsabs.harvard.edu/abs/1984ApJ...277..623S>
- Field, Goldsmith & Habing 1969 <http://adsabs.harvard.edu/abs/1969ApJ...155L.149F>
- Wolfire et al. 1995 <http://adsabs.harvard.edu/abs/1995ApJ...443..152W>
- Larson 1981 <http://adsabs.harvard.edu/abs/1981MNRAS.194..809L>
- Goodman, Pineda & Schnee 2009 <http://adsabs.harvard.edu/abs/2009ApJ...692...91G>
- McKee & Ostriker 1977 <http://adsabs.harvard.edu/abs/1977ApJ...218..148M>
- Ostriker, McKee & Leroy 2010 <http://adsabs.harvard.edu/abs/2010ApJ...721..9750>

What we need to define

- *By Monday 22nd need to know the groups (2 person per group)*
- *Once the group are established I will assign randomly the papers*

Time schedule

- *Report due by OCTOBER 31st*
- *Questions due by NOVEMBER 21st*

Discussion date: Questions due 21.11.2022 for the 10 report

- 24.11.2022 we will discuss the first 4 papers/reports
- 28.11.2022 we will discuss other 2 papers/report
- 01.12.2022 we will discuss the last 4 papers/report