PHY 475
Literature Review 1

Stage 1 (*due in D2L Dropbox by 5 PM, Thursday, 4/5*)

The Astrophysical Journal is one of the leading journals in the field of astronomy and astrophysics. It can be viewed at the link http://iopscience.iop.org/0004-637X; see the next page for help with access information.

Your task for this stage of the literature review will be to look through the issues of the Astrophysical Journal for the past year (both 2011 & 2012 are acceptable), and ***pick out any 3 papers related to cosmology***. You should not pick more than one paper from an issue (i.e., the 3 papers should be from 3 different publication dates).

For each paper that you picked, write a **1-page summary** with the following information:

- **Title of the paper**:

- **Identification reference**: This is usually the first author with et al. attached if there is more than one author, followed by year of publication, followed by journal name – in this case ApJ, volume number, page number

- **Brief summary** of what the paper is about: Please don't just paraphrase the abstract, but try to write by looking through the whole paper; clearly, you won't understand everything in it (neither would I, since it is not my research specialty), but the idea is to pick out details that are larger than what the authors have reported in the abstract. One way of arranging what you're going to present in your 1-page summary is to arrange your information around questions like "What did they do? How did they do it? What did they find?"

Students often get worked up about typographical details and ask me what they should be. My advice is that they should be reasonable. I would stick to single spacing, since a double-spaced 1 page doesn't give you much room to express yourself and will make it appear like you were trying to just put in an assignment instead of being engaged in putting in a good assignment. I wouldn't use anything larger than Times New Roman 12-pt font, and I would keep 1-in margins on all sides.

Since any issue of the Astrophysical Journal covers a vast array of subjects including Cosmology, another question that naturally comes to mind is: How do we know to pick out what is Cosmology before we've studied it? My glib answer to this question might be: "That's why it is an assignment for graduate students. Figure it out!" Perhaps a more helpful answer would be: "Think of ways in which you could figure out the subject matter. For example, if the title of the paper contains 'Cosmology' or some variant of it, there's a good possibility it might be a cosmology paper. Another way might be to look at the title and abstract, and see if any of the material there is mentioned in the chapter listing in your text by Ryden. Yet another way might be to track down the webpage of the primary author, and see if she/he is a cosmologist (although that doesn't necessarily mean this particular paper has to be about cosmology, but it does increase the probability that it is). All said, with two issues a month, there are enough journal issues to choose from that you shouldn't have any problems identifying 3 papers.

This assignment is due in the D2L Dropbox by 5 PM on Thursday (4/5). Late assignments will not be accepted under any circumstances.

Additional Information for Astrophysical Journal access

To view the full paper in the Astrophysical Journal, you will need to be at DePaul (either on a DePaul computer, or in its wireless/wired domain).

If you're outside DePaul, you can try looking up the paper at the NASA ADS service at http://adsabs.harvard.edu/abstract_service.html, and check if they authors put up a freely accessible preprint of their paper (it should say arXiv e-print; see example below).

Example:

If you enter the first author's name into the box for Author's names at the ADS page listed above, you will get a listing of all the papers by that author. When you choose the one you're looking for by matching up the title or, better still, by matching up the year of publication, journal number, and page number, you should see a listing like this (*the example is from one of my recent papers*):

SAO/NASA ADS Astronomy Abstract Service

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· **Citations to the Article (1)** (Citation History)
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· **Translate This Page**

If you're outside DePaul, you should look at this link to obtain a freely accessible preprint. Note that not all authors may have provided such a link.

Title:	Discovery of the Zeeman Effect in the 44 GHz Class I Methanol (CH_3OH) Maser Line
Authors:	Sarma, A. P.; Momjian, E.
Affiliation:	AA(Physics Department, DePaul University, 2219 North Kenmore Avenue, Byrne Hall 211, Chicago, IL 60614, USA asarma@depaul.edu), AB(National Radio Astronomy Observatory, Socorro, NM 87801, USA)
Publication:	The Astrophysical Journal Letters, Volume 730, Issue 1, article id. L5 (2011). (ApJL Homepage)
Publication Date:	03/2011
Origin:	IOP
Astronomy Keywords:	ISM: clouds, ISM: magnetic fields, masers, polarization, radio lines: ISM, stars: formation
DOI:	10.1088/2041-8205/730/1/L5
Bibliographic Code:	2011ApJ...730L...5S

Abstract

We report the discovery of the Zeeman effect in the 44 GHz Class I methanol (CH_3OH) maser line. The observations were carried out with 22 antennas of the Expanded Very Large Array toward a star-forming region in OMC-2. Based on our adopted Zeeman splitting factor of z = 1.0 Hz mG^{-1}, we detect a line-of-sight magnetic field of 18.4 ± 1.1 mG toward this source. Since such 44 GHz CH_3OH masers arise from shocks in the outflows of star-forming regions, we can relate our measurement of the post-shock magnetic field to field strengths indicated by species tracing pre-shock regions, and thus characterize the large-scale magnetic field. Moreover, since Class I masers trace regions more remote from the star-forming core than Class II masers, and possibly earlier phases, magnetic fields detected in 6.7 GHz Class II and 36 and 44 GHz Class I methanol maser lines together offer the potential of providing a more complete picture of the magnetic field. This motivates further observations at high angular resolution to find the positional relationships between Class I and Class II masers, and masers at various frequencies within each category. In particular, CH_3OH masers are widespread in high- as well as intermediate-mass star-forming regions, and our discovery provides a new method of studying the magnetic field in such regions, by observing small physical scales that are not accessible by any other lines.