Syllabus for PHYS 351-Seminar in Modern Physics, Spring '03

Basic information:

-Prerequisites: PHYS 312 and 314 or consent of the instructor. I'm assuming that you've had some exposure to quantum mechanics as well as upper level laboratory experience. They are not absolutely necessary, but journal articles can be hard enough to understand as is!!

-Class hours and location: TTh 11:00-11:50 am in the physics seminar room: Wright 102A.

-Textbook: There are no required textbooks for this class. We will be working from primary literature as well as more general review articles.

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Description:

In this course, we will study a series of recent articles drawn from the primary literature (journals such as *Physical Review Letters*, the *Astrophysical Journal*, and *Science*). In order to make headway in understanding the somewhat complicated articles, we will make use of reviews, authors' web sites, other texts, and each other!

Objectives: The objectives of the seminar are two-fold: 1) to increase understanding/knowledge about recent physics research results and 2) to improve presentation, literature-researching skills.

Format: Each student will be responsible for presenting at least one article (and as many as time permits). A preliminary presentation will be made, describing the general features and issues that are unclear. Other students will be responsible for helping provide direction by asking additional questions that should be answered at the final presentation. For the final presentation, a written summary of the article (~2 pages) will be prepared.

Grading: Grading for the course will be based as follows: 20% preliminary presentations, 20% class participation, 20% written summaries, 40% final presentations.

Resources: Below is a list of some recent articles with sources of other related information:

Article citation	Topic	Other sources
Astrophysics		
Nature **415**, 985, 2002	Measurements of Jupiter's magnetosphere	From APS News, Feb. 2003, vol 12, #2-year in review
Shaviv, *Phys. Rev. Lett.* **89**, 051102, 2002	Cosmic rays and the connection to ice ages	From APS News, Feb. 2003, vol 12, #2-year in review
Elgaroy et al, *Phys. Rev. Lett.* **89**, 061301, 2002	Upper limit to the neutrino mass	From APS News, Feb. 2003, vol 12, #2-year in review
Eguchi et al, Phys. Rev. Lett. 90, 021802, 2003	Solar neutrino experiment	Phys. Today, Mar. 2003, p. 14
Atomic, molecular, and optical physics		
Sauer et al, *Phys. Rev. Lett.* **87**, 27040, 2001	Storing neutral atoms	From APS News, Feb. 2003, vol 12, #2-year in review
Yokoyama et al, *Appl. Phys. Lett.* **80**, 7, 2002	Making a laser from dendrimers (tree-like polymers)	From APS News, Feb. 2003, vol 12, #2-year in review
Turukhin et al, *Phys. Rev. Lett.* **88**, 023602, 2002	Slowing and storing light in a solid	From APS News, Feb. 2003, vol 12, #2-year in review +Phys. Today, Mar. 2001, p. 17
Granade et al, *Phys. Rev. Lett.* **88**, 120405, 2002	Optical trapping of a degenerate Fermi gas	From APS News, Feb. 2003, vol 12, #2-year in review + Phys. Today, July 2001, p. 20, Sept. 2001, p. 79
Strecker et al, *Nature* **41**7, 150 2002 or Khaykovich et al, *Science* **296**, 1290, 2002	Solitons in a Bose-Einstein condensate	From APS News, Feb. 2003, vol 12, #2-year in review
Brezger et al, *Phys. Rev. Lett.* **88**, 100404, 2002	Matter wave interferometer for large molecules	From APS News, Feb. 2003, vol 12, #2-year in review
Biological physics/fluid physics		
Zeff et al, *Nature* **421**, 146, 2003	Turbulent flow studied with lasers	Phys. Today, Mar. 2003, p. 18
Ding et al, *Phys. Rev. Lett*. **88**, 168102, 2002	Viscosity of 2D suspensions	From APS News, Feb. 2003, vol 12, #2-year in review
Braun et al, *Phys. Rev. Lett*. **89**, 188103, 2002	Trapping DNA in solution	Phys. Today, Feb. 2003, p. 16
Condensed matter/materials physics		
Pejakovic et al, *Phys. Rev. Lett.* **88**, 057202, 2002	Light activated plastic magnet	From APS News, Feb. 2003, vol 12, #2-year in review
Nagamatsu et al, *Nature* **410**, 63, 2001	Superconductivity in MgB_2	Phys. Today, Mar. 2003, p. 34
Solin et al, *Appl. Phys. Lett.* **80** 4012, 2002	A nanoscale nonmagnetic read head sensor	From APS News, Feb. 2003, vol 12, #2-year in review
M. Ciorga et al, *Phys. Rev. Lett.* **88**, 256804, 2002	Single spin transistor	From APS News, Feb. 2003, vol 12, #2-year in review
Particle, nuclear, plasma physics		
Abe et al, *Phys. Rev. Lett.* **89**, 071801, 2002	CP violation in B meson decays	From APS News, Feb. 2003, vol 12, #2-year in review
Foster et al, *Rev. Sci. Instr.* **73**, 2020, 2002	Microsatellite propulsion with a plasma	From APS News, Feb. 2003, vol 12, #2-year in review

Here's another list of sources that might be good for more accessible information about a particular topic:

1) Physical Review Focus, summaries of Phys. Rev. Lett. and Phys. Rev. articles intended for a more general audience.
http://focus.aps.org/

2) Physics Today, the monthly magazine for the American Physical Society and related societies.
http://www.aip.org/pt

3) APS News, mostly society news, but also some summaries of interesting discoveries.
http://www.aps.org/apsnews/

4) Nature's science update section
http://www.nature.com

5) Websites associated with the authors of the article, particularly in the case of "big science" work, conducted at a major facility or national laboratory.

6) the magazine *Science News*, available in the library, summarizing current discoveries (although not as much emphasis on physics.

7) Oberlin physics faculty, with areas of specialization listed below:
Krsna Dev, general relativity
Stephen FitzGerald, condensed matter physics, fullerenes, IR spectroscopy
Yumi Ijiri, condensed matter physics, magnetic materials
Bruce Richards, musical acoustics
John Scofield, condensed matter physics, solar cells
Dan Stinebring, astrophysics, radio astronomy
Dan Styer, statistical mechanics, implications of quantum mechanics
Bob Warner, nuclear physics
Bob Weinstock, mathematical physics

8) Using databases
a) INSPEC: http://rave.ohiolink.edu/databases/login/insp
The best search engine for physics and engineering materials. In addition to searching on author, title, and keywords, this database extensively references materials so you can search by descriptors etc.
b) Science citation index: http://cite.ohiolink.edu/isi/CIW.cgi
A good way to track down a particular author and those who cite him/her.