SYLLABUS: PHYS 427A/ 576B/ 585 (FALL 2015)

1. Why Are There Three Different Course Numbers?

<table>
<thead>
<tr>
<th>Number</th>
<th># Credits</th>
<th>Grade Type</th>
<th>Meeting Times</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>427A</td>
<td>3</td>
<td>Graded</td>
<td>Tuesdays &amp; Thursdays</td>
<td>Rybka</td>
</tr>
<tr>
<td>576B</td>
<td>3</td>
<td>Ungraded</td>
<td>Tuesdays &amp; Thursdays</td>
<td>Rybka</td>
</tr>
<tr>
<td>585</td>
<td>1</td>
<td>Ungraded</td>
<td>Thursdays only</td>
<td>Parno</td>
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</tbody>
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Tuesdays will be more technical and detailed. Thursdays will cover recent or particularly important results, more like a Journal Club.

Meetings are currently scheduled in Physics B101, 9:30 - 10:50 am. At our first meeting Oct. 1, we will vote on whether to hold Thursday meetings at CENPA (in Room 178).

2. Contact Information

Phys 427A and 576B
Instructor: Gray Rybka
Email: grybka@uw.edu
Offices: Physics C501 (tel. 206-543-2797)
CENPA/NPL 206 (tel. 206-543-4261)

Phys 585
Instructor: Diana Parno
Email: dparno@uw.edu
Office: CENPA/NPL 184 (tel. 206-543-1493)

Public Course Website: http://faculty.washington.edu/dparno/dmseminars.html
MyCanvas Course Websites: available via MyPlan for 427A and 576B students

3. Course Objectives

Dark matter and dark energy are exciting and crucial frontiers in modern physics. This course will provide a broad survey of dark matter candidates and experiments. During the quarter, students will:

- Read a variety of papers on recent and important results in dark matter detection
- Present at least one paper to their classmates
- Actively discuss and critique historical and modern research progress

4. Preparation

The outline of this course is loosely adapted from a recent survey paper: M. Klasen, M. Pohl, and G. Sigl, *Indirect and direct search for dark matter*, Prog. Part. Nucl. Phys. 85, 1 (2015) (http://www.sciencedirect.com/science/article/pii/S0146641015000460). This review paper will be a useful starting point for reviewing any of the topics to be covered.
5. When It’s Your Turn To Present

(1) Select a paper or papers that you will present – no more than 10 or 15 pages total. There is a shortlist of suggested papers for each topic.
(2) Email Gray and Diana your paper selection. We will distribute it to the class.
(3) Prepare and deliver a 15-30-minute presentation to explain the material to your classmates. You may find it useful to do some additional reading and research. You may choose between a chalk talk or a talk with presentation software.
(4) After your presentation, lead the discussion, and answer questions as you are able.
(5) Afterward, Gray and Diana will send you brief constructive feedback on your talk. Grades for Phys 427 students will largely be based on presentations.

6. When It Isn’t Your Turn To Present

(1) Read the paper(s) selected by the presenter.
(2) Phys 427/576 students: Write down a question about the paper for participation credit. Turn it in at the start of class, or email it to Gray and Diana ahead of time. Random questions will be drawn if there is a lull in the discussion.
(3) Listen attentively to your classmate’s presentation.
(4) Participate in the discussion. The discussion should be respectful even in cases of profound disagreement.

7. Course Policies

• Travel: If you expect to be away for two or more meetings, enroll in Phys 585. Do the reading while you’re away and send Diana a discussion question.
• Switching dates: If you cannot present on a date that you signed up for, find a classmate willing to switch dates/topics with you, and we will accommodate you.
• Questions on a paper: If you’re having trouble figuring out some aspect of what you’re presenting, consult with Gray and/or Diana. (Email is likely the most practical way to communicate.) Please ask your question at least 24 hours in advance of the presentation so that there’s time for research and a conversation.
• Access and accommodations: We want to give you the tools you need to succeed in this class. If you have already established accommodations with Disability Resources for Students (DRS), please communicate your approved accommodations to us at your earliest convenience so we can discuss your needs in this course. If you have not yet established services through DRS, but you have some temporary or permanent condition that requires accommodations, we recommend that you contact DRS (206-543-8924, uwdrs@uw.edu, disability.uw.edu) so that we can work together to coordinate reasonable accommodations.
• Unforeseen circumstances: Explain the situation to Gray and Diana and we will see what we can do.
8. Schedule

This schedule, and the specific topics emphasized, may change based on student interest.

(1) Oct. 1: Organization and overview
(2) Oct. 6-8: Evidence for Dark Matter
(3) Oct. 13-15: Dark Matter Candidates
(4) Oct. 20-22: Semiconductor Searches (e.g. CDMS and CoGeNT)
(5) Oct. 27-29: Liquid Noble Gas Searches (e.g. XENON, LUX, and DEAP)
(6) Nov. 3-5: Bubble Chamber / TPC / NaI / Cosmic Ray Searches
(7) Nov. 10-12: Resonant Cavity Searches (e.g. ADMX)
(8) Nov. 17-19: NMR / Fifth Force Searches
(9) Nov. 24: X-ray/Gamma/Microwave Lines (e.g. Fermi)
(10) Dec. 1-3: Dark Matter at the LHC
(11) Dec. 8-10: Open Topics: Exotic Dark Matter Candidates? Unusual experiments?

9. Welcome to the Course!

We’re looking forward to exploring some of the wildest aspects of From WIMPs to WISPS, from monojets to miniature black holes, we hope you’ll all enjoy the trip.