Week 5: Reading & Homework Assignment # 5

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Office Hours: Anytime (by appt. preferred…)

Lab TAs: Matt Ziemann  mrziema2@illinois.edu  
Office Hours: Wednesdays, 10:00-11:00 am  6105 Eng. Sci. Bldg. (or by appt.)

John Whitman  jwhitma2@illinois.edu  
Office Hours: Mondays, 12 noon-1:00 pm  6105 Eng. Sci. Bldg. (or by appt.)

Course Textbook(s): Physics 406 Lecture Notes (posted on P406 website – see below)  

Course Website:  http://courses.physics.illinois.edu/phys406/  
http://courses.physics.illinois.edu/phys193/  
All lecture notes, lab handouts, additional references, previous student final project reports (and much more) are available on the P406 (and P193) website(s). Please check these out!

Course Organization:

A. Lectures: Tuesdays & Thursdays, 12:30-1:50 pm, in the POM Lab (6105 ESB).  
We will also have various demos using equipment in the POM Lab (6105 ESB).

B. Friday Labs: Lab1 @ 11:00 am -1:50 pm, Lab2 @ 2:00-4:50 pm in the POM Lab (6105 ESB)

First part of the semester will consist of doing various simple/short experiments using equipment and/or software in the lab. Will discuss this in the 1st lab session(s) this coming Friday. Second part of semester, labs will be focused on student project(s) – more on this below.

C. Weekly Reading and Homework Assignments: HW due following week on Thursday, in class.

D. Take-Home Midterm Exam: Tuesday, March 8, 2016, Due: Thursday, March 17, 2016

E. Midterm Project Oral Presentations: Brief! In class – Tues & Thurs, March 8 & 10, 2016

F. Final Project Oral Presentations: Brief! In class – Thurs, April 28 & Tues, May 3, 2016

G. Take-Home Final Exam: Tuesday, April 26, 2016, Due: Friday, May 6, 2016

H. Final Project Written Report: Due: Friday, May 13, 2016

Reading Assignment For Week 5: Please read Physics 406 Lect. Notes V- VIII,  
the Consonance/Dissonance Lect. Notes  
and also read Science of Sound (SoS), Ch. 8 & 9.

Homework Assignment For Week 5: SoS Ch. 8: Exercises 3*, 6, 8  
SoS Ch. 9: Exercises 1, 3, 4, 5, 7

Final grade based on:  
ΣHW’s: 20%  
MT: 15%  
FE: 30%  
FP: 35% ( = Σ mid-term & final oral presentations, final written report).

* n.b. The last entry of Table 8.1 p. 154 in SOS is incorrect!  
See next page (i.e. PTO) for the correct table !!!
The **Correct, Full Version** of Table 8.1 (p. 154 SOS):

Use phasor addition (see p. 24 P406 Lecture Notes 5): 

\[ A_{tot} = \sqrt{A^2 + B^2 + 2AB \cos \delta} \]

Phase difference: \( \delta \equiv \varphi_A - \varphi_B \)

<table>
<thead>
<tr>
<th>Phase difference: ( \delta \equiv \varphi_A - \varphi_B )</th>
<th>( \cos \delta )</th>
<th>Resultant Amplitude: ( A_{tot} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°</td>
<td>+1</td>
<td>( A + B )</td>
</tr>
<tr>
<td>45°</td>
<td>( \frac{1}{\sqrt{2}} )</td>
<td>( \sqrt{A^2 + B^2 + \sqrt{2}AB} )</td>
</tr>
<tr>
<td>90°</td>
<td>0</td>
<td>( \sqrt{A^2 + B^2} )</td>
</tr>
<tr>
<td>135°</td>
<td>( -\frac{1}{\sqrt{2}} )</td>
<td>( \sqrt{A^2 + B^2 - \sqrt{2}AB} )</td>
</tr>
<tr>
<td>180°</td>
<td>-1</td>
<td>( A - B )</td>
</tr>
<tr>
<td>225°</td>
<td>( -\frac{1}{\sqrt{2}} )</td>
<td>( \sqrt{A^2 + B^2 - \sqrt{2}AB} )</td>
</tr>
<tr>
<td>270°</td>
<td>0</td>
<td>( \sqrt{A^2 + B^2} )</td>
</tr>
<tr>
<td>315°</td>
<td>( \frac{1}{\sqrt{2}} )</td>
<td>( \sqrt{A^2 + B^2 + \sqrt{2}AB} )</td>
</tr>
<tr>
<td>360°</td>
<td>+1</td>
<td>( A + B )</td>
</tr>
</tbody>
</table>

\( n.b. this \) entry is **incorrect** in Table 8.1 of SOS book, p. 154