Ph 136a
Applications of Classical Physics

Problem Set 7

Due **before 1:00pm** Wednesday 25 Nov, 2020

Readings: Readings for this week are to complete reading Chapter 7 of Thorne & Blandford *Modern Classical Physics*, hereafter called TBMCP. You may skim to a depth appropriate to your interest level the Track 2 material in Sections 7.5 (Caustics and Catastrophe theory), 7.6 (Gravitational Lensing), and 7.7.2 (Berry phase) —they are all interesting, awesome and important (e.g. for Fast Radio Bursts!), but not examinable in this course.

Non-Collaboration Problem Notice that problem 1 is a non-collaboration problem: you must solve this problem on your own (as if it were an untimed quiz), without discussing it with other students, or with the TA (see the collaboration and grading policy for how these will be graded and used: http://www.its.caltech.edu/~esp/ph136a/Policies.pdf)

Submitting your homework Please upload your completed homework solutions as a `pdf` file to Canvas. If that fails to work, you may instead email the file to the TA, `twang3@caltech.edu`, with the subject line `ph136 homework 7`. Note that Caltech email will reject attachment sizes larger than 10Mbyte, so be conscious of scanning parameters!

Homework Problems: (50 points total)

1. **TBMCP Problem 7.2 NONCOLLABORATION (13 points: 2+1+4+2+4)** *Gaussian Wave Packet and Its Dispersion*

   For part (e), ocean waves are deep water surface waves, whose dispersion relation is given by TBMCP equation (7.5).

2. **TBMCP Problem 7.5 (15 points: 4+4+7)** *Propagation of Sound Waves in a Wind*

3. **TBMCP Problem 7.8 (10 points: 5+5)** *Self-Focusing Optical Fibers*

4. **TBMCP Problem 7.12 (12 points: 4+2+4+2)** *Optical Cavity —Rays Bouncing between Two Mirrors*