Homework Assignment #4, Explaining Physics Concepts to Non-Scientists—Draft

The purpose of this assignment is to give you practice in explaining scientific concepts in a way that is clear, concise, and meaningful for non-experts. You'll read a seminal paper by one of our faculty and then write a news story about one aspect of it. For this assignment, your audience is non-scientists who have a general interest in physics and *may* have taken an introductory physics class in college but have no specific knowledge of physics research. Your job is to pick one aspect of work described in the paper (the method, the instrument, the experimental technique, the theory behind the work) and explain it in terms that an ordinary person could understand. DO NOT simply regurgitate the whole paper. This assignment consists of several parts (enumerated below). Be sure to complete all parts!

First select one of the papers on the next page. You should choose a paper where you have a solid grasp of the physics; the point of this assignment is to communicate that understanding to a general audience, not to learn some new physics. Read the great advice from Professor Mason before you start writing.

To give you an idea of what to do, first look over Ryan Gaudet et al., "A human apolipoprotein L with detergent-like activity kills intracellular pathogens," *Science* 373, 296 (2021). Then look at the popular science piece written by John D. MacMicking at Yale (q.v. https://www.hhmi.org/news/human-cells-harness-power-of-detergents-to-wipe-out-bacteria). It's a brilliant piece of science writing—*cme*.

Each of the papers on the list has been written recently by a member of our faculty. We recommend that you talk to someone in the research group for additional insight about the work being reported in the paper. (Look at the author list and the affiliations to see who might be here in the department and then use the campus directory to find contact information for that person. The name of the supervising faculty member is underlined in the citation for each paper.)

1. Based on class discussions, write a five-sentence synopsis and full-sentence outline for your story. (The synopsis and outline are for the story that you're going to write, **not** the paper you read.) Remember that each sentence in your outline will equal about one paragraph in your story, and you are limited to three pages total in the final paper, including the figures and references. Thus, you should have no more than six to nine sentences in your outline.
2. Find at least two figures that illustrate your story. You might get these figures from the paper itself (although those figures are probably too advanced for a general audience), from other sources, or even ones you create yourself to help the reader visualize and understand your story. If you use someone else's figure, be sure to credit the source. Keep in mind what your target audience would understand and find visually appealing. (Complicated plots are usually not good choices for a general audience.) Insert the figures in your document and provide a brief caption for each. Write your own caption; don't just copy the caption from the original source—that's plagiarism!
3. Identify four sources of supplemental information on the Internet that would help a reader understand your story or could provide additional information for the reader. Be sure these sources are written at an appropriate level for your target audience. Provide the URLs for these sources.

You will receive feedback on this assignment to help you strengthen your final paper for Homework #5.

Due: **Friday, Feb 17, 9:00 p.m.** Upload your copy to the my.physics portal. Assignments submitted after the deadline will have points deducted. Late assignments may be uploaded to my.physics until 8:59 p.m. on Sunday, Feb 19. To submit an assignment after the late deadline, email it to Celia. This assignment is not eligible for rewrite points.

Total—50 points

List of Papers:

M. Shankla and A. Aksimentiev, "Conformational transitions and stop-and-go nanopore transport of single-stranded DNA on charged graphene," *Nature Communications* **5**, 5171 (2014).

K. Yagi and N. Yunes, "I-Love-Q: Unexpected Universal Relations for Neutron Stars and Quark Stars," *Science* **341**, 365–368 (2013).

L.K. Shalm, et al., "Strong Loophole-Free Test of Local Realism," *Phys. Rev. Lett.* **115**, 250402 (2015). (Professor Kwiat is a co-author of this paper, which also has a Viewpoint here: https://physics.aps.org/articles/v8/123.)

Y. Zhang, Y. Kim, M.J. Gilbert, and N. Mason, "Electronic transport in a two-dimensional superlattice engineered via self-assembled nanostructures," *npj 2D Mater Appl* **2**, 31 (2018).