

UNIVERSITY OF ALABAMA
Department of Physics and Astronomy
PH 491/591 Fall 2022

Instructions:

1. This should be turned in *individually* not as a team
2. However: you can work together on the scavenger hunt and discuss the article together
3. Nominal due date: 25 August 2022

Assignment: reading response & scavenger hunt

Part 1: reading response

Write a “one page” response to the *Inverse Occam’s Razor* article (<https://www.nature.com/articles/s41567-022-01575-2>) by Mazin. Don’t recap the article; I’ve already read it. Just give your honest take and unfiltered thoughts. Do you have any personal examples that are relevant?¹

Grading: 50% of this assignment, full points given for all reasonable attempts.

Part 2: scavenger hunt

Find all the things. Use teamwork to your advantage. Grading: 50% of this assignment, score is the percentage of things found (with partial credit for partial finds).

1. Finding papers! Ivar Giaever shared a Nobel for electron tunneling into superconductors.
 - (a) In his Nobel lecture, he begins with a quote from his lab notebook. What is it?
 - (b) In his first paper on tunneling, what was the lowest measurement temperature?
 - (c) According to APS, how many citations does that paper have? Provide the citation please.
2. Finding reference information!
 - (a) What is the f_1 x-ray scattering form factor for Co at 10 keV? (Hint: NIST)
 - (b) What is the Nuclear-Thomson correction to the X-ray form factor for Co?
 - (c) What are reasonable values for the Poisson ratio of cork, rubber, and steel?
 - (d) Will a magnet stick to 316 steel?
3. More reference information! I have a bath of liquid helium, ^4He .
 - (a) I can reduce the pressure above the liquid to 0.5 Torr. What is the liquid temperature?
 - (b) What if it were ^3He instead?
 - (c) Where would I get liquid helium from, to deliver to UA campus? (Hint: who needs to know?)
4. Sometimes you need weird information. Harm Wieldraaijer and I did our PhD in the same group.
 - (a) What is the third reference on page 111 of his dissertation? (Hint: not a physics text.)
 - (b) What was the cover art on his dissertation? (Hint: where is the reference cited in the text?)
 - (c) What does Harm do now?

¹Related article: <https://doi.org/10.1038/s41565-022-01166-5>