

Homework 1

Due Date: Jan 21, 2025

1.1 Emergent Phenomena.

Readings and Resources: Carefully read the following articles:

- (1) Phillip W. Anderson, *More is Different*, "Science" **177**, 393 (1972).
- (2) R. B. Laughlin and D. Pines, *The Theory of Everything*, "Proceedings of the National Academy of Sciences of the United States of America" **97**, 28 (2000).
- (3) S. Weinberg, *From BCS to the LHC*, "International Journal of Modern Physics A", **23**, 1627 (2008).
- (4) John J. Hopfield, *Whatever Happened to Solid State Physics?*, "Annual Review of Condensed Matter Physics", **5**, 1 (2014).

Additionally, listen to the following podcast:

- (1) Nigel Goldenfeld, *"How Is Science Even Possible?"* Quanta Magazine, 20 June 2024, <https://www.quantamagazine.org/how-is-science-even-possible-20240620/>.

Essay Assignment: Compose a comprehensive essay, spanning 5 to 10 pages, that critically analyzes the above readings. Your essay should demonstrate a deep understanding of the topics discussed and provide original insights. In addition, include the following supplementary sections:

- (a) A dedicated page providing brief biographies of each author, emphasizing their significant contributions to the field of physics.
- (b) A separate page listing and defining concepts encountered in the articles that were unfamiliar prior to reading.

Expectations:

- (a) High-quality writing and presentation, demonstrating clarity, coherence, and fluency. *Effective writing skills are essential for research and are often underemphasized in physics education.*
- (b) A critical and thorough reading of the papers—summaries should reflect deeper analysis, not just abstracts.
- (c) Use LaTeX for writing your essay.
- (d) Submit your essay's LaTeX source file, all supporting files, and the generated PDF by email to masmar@kennesaw.edu.

Note: All the articles are available in the D2L system.