Journal of Physics and Astronomy

Opinion | Vol9 Iss11

Opinion on: Condensed Matter and Material Physics

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Received date: November 5 ,2021; **Accepted date:** November 20 ,2021; **Published date:** November 25 ,2021,2021

Keywords: Plasmonics; Spintronic; Condensed-matter

Introduction

Condensed-matter physics is the study of substances in their solid state. This includes the investigation of both crystalline solids in which the atoms are positioned on a repeating three-dimensional lattice, such as diamond, and amorphous materials in which atomic position is more irregular, like in glass.

The physics of the condensed matter deals with the synthesis, manipulation, and properties (i.e., electronic, magnetic, and optical) of liquid and solid materials. The subfield highly overlaps with interdisciplinary, chemistry, materials science and electrical engineering and often drives technological progress through foundation insights. It is the largest subfield in physics, with one-third of American physicists identifying themselves as frozen physicists. The large community translates into a wide. Some current interesting materials include graphene, 2D materials, colloids, quantum dots and wires, correlated chalcogenides and complex oxides. They allow us to study topology, spintronic, superconductors, plasmonics, quits, magnetic skyrmions, and exciton phenomena. Variety of materials and structures studied and funded, into many opportunities in terms of research and employment. The physics of frozen matter is an ever-evolving field that often focuses on evolving materials and physical phenomena.

The diversity of systems and phenomena available for study makes condensed matter physics the most active field of contemporary physics: one third of all American physicists self-identify as condensed matter physicists, and the Division of Condensed Matter Physics is the largest division at the American Physical Society. The field overlaps with chemistry, materials science, engineering and nanotechnology, and relates closely to atomic physics and biophysics. The theoretical physics of condensed matter shares important concepts and methods with that of particle physics and nuclear physics.

History of Condensed Matter Physics

One of the first studies of condensed states of matter was by English chemist Humphry Davy, in the first decades of the nineteenth century. Davy observed that of the forty chemical elements known at the time, twenty-six had metallic properties such as lustre, ductility and high electrical and thermal conductivity. This indicated that the atoms in John Dalton's atomic theory were not indivisible as Dalton claimed, but had inner structure. Davy further claimed that elements that were then believed to be gases, such as nitrogen and hydrogen could be liquefied under the right conditions and would then behave as metals.

Citation: Shira EV. Opinion on: Condensed Matter and Material Physics. J Phys Astron.2021;9(11):249.