Contributions of Early Muslim Scientists to Engineering Sciences and Related Studies

Editors
Abdi O. Shuriye
Waleed F. Faris

IIUM Press
Contents

TITLE
Preface v
Acknowledgment vi
Lists of Contributors vii
Introduction 1
Chapter 1 Al-Battani’s Contribution to Astronomy 3
Chapter 2 Safiha by Al-Zarqali 8
Chapter 3 Ibn Al Shatir’s Influence on Modern Astronomy 12
Chapter 4 I-Zarqali on Instrumentation 19
Chapter 5 Contributions of Al-Razi on Alchemy in Terms of Metal and Substance 24
Chapter 6 Jabir Ibn Hayyan’s Work on Sulphur-Mercury Theory 30
Chapter 7 The Contribution of Hassan Al-Rammah to Gunpowder and Rocket Technology 36
Chapter 8 The Contribution of Ibn Al-Awwam in Botany and Agriculture 41
Chapter 9 Al-Battani Contributions in Astronomy and Mathematics 45
Chapter 10 Al-Biruni’s Views on the Discovery of the Spherical Earth 49
Chapter 11 Al-Kashi and Access to the Arithmetic & Astronomy 53
Chapter 12 Nasir Al-Din Al-Tusi’s Understanding of Trigonometry 58
Chapter 13 Al-Biruni’s Experimental Scientific Methods in Mechanics 65
Chapter 14 Al-Haytham’s Understanding of Physical Nature of Light 70
Chapter 15 Contributions of Ibn Al-Haytham on Optics 74
Chapter 16 Energy Particle-Physics: The Efforts of Abdel Nasser Tawfik 80
Chapter 17 Mahmoud Hessaby’s Contribution to the Infinitely Extended Particles Theory in Quantum Physics 86
Chapter 18 The Contribution of Ibn Ishaq Al-Kindi to Light, Optics and Cryptology 91
Chapter 19 The Contribution of Ibn Sahl in Refraction of Light 95
Chapter 20 Al Kindi on Pharmacology 103
Chapter 21 Contributions of Kerim Kerimov in Aerospace Engineering 110
Chapter 22 Fazlur Rahman Khan’s Understanding of Tube Structural System of Skyscrapers 115
Chapter 23  Contribution of Lofti Asker Zadeh to Fuzzy Logic  121
Chapter 24  The Nano World of Munir Nahfey  127
Chapter 25  Abbas Ibn Firmas’s Contribution in Aviation  135
Chapter 26  Al-Jazari Contribution to the Development of Water Supply System  139
Chapter 27  Contribution of Tipu Sultan to Rocket Technology  143
Chapter 28  The Contributions of Al-Khazini in the Development of Hydrostatic Balance and its Functionality  147
Chapter 29  The Contribution of Banu Musa Brothers in the Self Changing Fountain  155
Chapter 30  The Invention of the Helium-Neon Gas Laser by Ali Javan  160
Chapter 31  Al-Jazari on Automata  165
CHAPTER SEVENTEEN

MAHMOUD HESSABY’S CONTRIBUTION TO THE INFINITELY EXTENDED PARTICLES THEORY IN QUANTUM PHYSICS

Sofiane Larbani, Raihan Othman
Fac. of Eng., International Islamic Univ. Malaysia (IIUM), Jalan Gombak, 53100 Kuala Lumpur, Malaysia.

17.1 INTRODUCTION

This chapter aims to highlight quantum physics and its major theories such as the infinitely extended particles. In fact, Classical mechanics functions very well for large objects that are moving much slower than the velocity of light. Nonetheless, once objects start to move very fast, we need to modify Newton's equations by relativistic equations. On the contrary, quantum theory becomes a necessity for objects that are extremely small. In this study, the importance of quantum theory will be investigated and explored. If Newton's laws were to be extended to domains that are far from daily experience, they will start to fail and give incorrect results. Historically, at the turn of the nineteenth century, the failure of Newtonian physics became very clear in the studies of the Atom (M. Hessaby, 1966).

However the question remains: What experimental evidence do we possess that Classical physics is invalid and that Quantum Theory, at present, is the most accurate explanation of how nature behaves. Classical physics is what intuitively follows from our five senses, and we have no purpose to naively extend the world apprehended by our five senses to microscopic domains of which we have no direct experience. The observations of radiation from a blackbody and its radiation (measured by spectroscopic lines) is the first experimental proof provided for Quantum Theory. Whenever one observes a neon or sodium light, one is observing Quantum theory in practice. Electronic devices such as computers, television, mobile phones etc., are all based on the semiconductor. Furthermore, airplanes, ships and cars all employ semiconductors in an essential way. It is not an exaggeration to predict that 21st century technology will chiefly be based on the principles of Quantum physics. The chief emphasis of this chapter is to offer answers on Quantum physics in general and the infinitely extended particles theory (M. Hessaby, 1947) which was established by the Muslim Professor Mahmoud Hessaby (born in 1903 in Tarfresh, Iran and died in 1992).

17.2 QUANTUM THEORY

To this point, Quantum mechanics has been practically in complete agreement with experimental results. Its theoretical underpinning is not well-understood; as Bohr said, one of the founders of Quantum theory maintains those who are not shocked by Quantum