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Dr. Syed Salman Ahmad Warsi is an accomplished physicist, academician, and educator with extensive expertise in condensed matter physics. He currently serves as an Associate Professor in the Department of Physics at Integral University, Lucknow, and brings more than 25 years of experience in teaching, research, and academic mentorship.

Throughout his academic career, Dr. Warsi has taught undergraduate and postgraduate students, making significant contributions to physics education through his dedicated teaching and research guidance. He has successfully supervised numerous B.Sc. and M.Sc. dissertations and projects and is actively involved in mentoring doctoral scholars pursuing Ph.D. research in Physics.

His research interests include liquid-crystal systems, nanoscale materials, and contemporary topics in condensed matter physics. Dr. Warsi has published several peer-reviewed research papers in reputed journals and continues to contribute actively to scientific research and academic development.

In addition to his research contributions, Dr. Warsi has co-authored important educational books, including:

- *ICSE Physics for Class X (2025)*
 - *ISC Practical Physics for Classes XI & XII (2021)*
- He has also served as editor of the following scholarly books:*
- *Characterization of Liquid Crystals and Photonic Crystals (2022)*
 - *Advances in Contemporary Physics: High Energy, Cosmology and Soft Matter (2025)*

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Published by: - Book Rivers

Website: - <https://www.bookrivers.com>

Email: publish@bookrivers.com

1st Print Edition – 2026

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Title: Contemporary Advances in Physics, Materials and Computational Sciences

Editor : Dr. Syed Salman Ahmad Warsi

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ISBN: 978-93-7837-031-1

MRP: 380 /-INR

(Printed in India)

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CHAPTER - 2

CHARGE, HEAT AND MOMENTUM TRANSPORT IN HOT QCD MATTER

¹Salman Ahamad Khan and ¹Mohd Shahalam

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This chapter gives an introduction to the transport coefficients such as electrical conductivity, thermal conductivity, shear viscosity, bulk viscosity and Seebeck coefficient of quark gluon plasma (QGP) which is the high temperature phase of quantum chromodynamics. We have given the definition of the transport coefficients in the frame work of relativistic kinetic theory and have also shown their temperature behavior. For a better understanding of the effects of collisions on the transport coefficients, we have discussed the behavior of all these coefficients in naive RTA as well as number conserving BGK collision terms.

INTRODUCTION:

Scientists have always been curious about what the universe is made of and how everything interacts with each other. To explain nature, physics identifies four basic forces that control all interactions. Gravity is the most familiar force. It works between objects that have mass and keeps planets, stars, and galaxies together. Einstein theory of general relativity is the most reliable classical theory used to explain gravity and its effects on the universe. However, scientists are still trying to develop a quantum-level explanation of gravity. The electromagnetic force acts between charged particles. In classical physics, it is explained using Maxwell equations, while at the quantum level it is described by Quantum Electrodynamics (QED). The weak force has a very short range and plays an important role in nuclear reactions such as radioactive decay and fusion processes. Its quantum description is known as Quantum Flavourodynamics (QFD). The strong force is responsible for holding the nucleus of an atom together. It operates among quarks and gluons, considered the fundamental building blocks of nature. The theory that explains this force is called Quantum Chromodynamics (QCD). Our universe is expanding over time and was once smaller and hotter,