Abstract of the Thesis
Index No.: 55/22/Phys./27

Title of the Thesis: Evolution of Black Holes and Anisotropic Neutron Stars under Late Time cosmic Acceleration

The dissertation focuses on the theoretical study of the evolution of the compact stars, such as black holes (BHs) and mainly massive and anisotropic neutron stars (NSs), through the present accelerated Universe under the framework of modified gravity. At the same time, the equation of state of the core nuclear matter of the neutron stars at extremely high density and pressure has also been investigated to construct a general EoS that can approximate many different candidate EoS with a few parameters. The $f(T)$ and $f(R,T)$ modified gravity theories have been employed to model the massive NSs in this investigation. Also the Quintessence field and modified Chaplygin gas (MCG) as a perfect fluid at the interior of the NSs have been introduced. The study focuses on the macroscopic properties, the relativistic behavior of binary systems, into observable characteristics of the NSs. Further the thermodynamics of the rotating BHs have also been studied. The presence of anisotropy at the interior plays a crucial role on the structure as well as physical properties of the NSs and also justify their non-squeezable nature with increase in mass. We can even explain the existence of super massive NSs with masses in the lower mass gap between $2.2 - 5.3M_{\odot}$. Interestingly, from our current models and investigations, all the derived outcomes have become compatible with physically adopted regimes which reveals the physical viability of our current study.

Mayukh Bandyopadhyay 10/05/2024
Mayukh Bandyopadhyay
(Ph.D. Candidate [55/22/Phys./27])
Department of Physics
Jadavpur University

Subenoy Chakraborty
Prof. Subenoy Chakraborty
(Ph.D. Supervisor)
Department of Mathematics
Jadavpur University
10/5/2024

Ritabrata Biswas 10/05/2024
Asst. Prof. Ritabrata Biswas
(Ph.D. Co-Supervisor)
Department of Mathematics
The University of Burdwan
Dr. Ritabrata Biswas
Assistant Professor
Department of Mathematics
The University of Burdwan