INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

Name of the Student	:	**BIPLOB SARKAR**
Roll Number	:	**11612118**
Programme of Study	:	**Ph.D.**
Thesis Title:		**Investigation of magnetized dissipative accretion flow around Black Holes**
Name of Thesis Supervisor(s)	:	**Dr. SANTABRATA DAS**
Thesis Submitted to the Department/ Center	:	**PHYSICS**
Date of completion of Thesis Viva-Voce Exam	:	**13/08/2018**
Key words for description of Thesis Work	:	**accretion, accretion discs, magnetic field, black hole physics, magnetohydrodynamics (MHD), shock waves**

SHORT ABSTRACT

In general, it is accepted that magnetic fields have a principal effect on the physics of accretion discs around black holes. The goal of this thesis is to present the efforts to investigate steady, optically thin, accretion solutions in such magnetized accretion discs around black holes. The thesis addresses three important points in accretion flows in the presence of magnetic fields which are presented in three chapters. In Chapter 2, we obtain steady, transonic solutions of accretion flow around black holes taking into account the azimuthal magnetic fields and Comptonization of bremsstrahlung radiation. We introduce the conditions for the formation of the shock heated region in the magnetized accretion flow around black holes. With this, we obtain the global transonic accretion solutions for dissipative magnetized flows and show that rotating magnetized accretion flow harbours centrifugally supported shock wave. We examine the properties of the shock wave and find that the dynamics of the post-shock flow (hereafter post-shock corona (PSC)) is controlled by the flow parameters. We separate the effective region of the parameter space for standing shock and observe that shock can form for a wide range of flow parameters. In Chapter 3, we concentrate on magnetized accretion flows around non-rotating stellar mass black holes. For these systems, we consider synchrotron cooling as the dominant radiative process active in the flow. We obtain the global transonic accretion solutions with shock and calculate the critical value of viscosity parameter for shock. We also calculate the synchrotron spectra for shocked solutions. In the work of Chapter 4, we investigate the properties of magnetized accretion flows around rotating black holes. We show that the rotation of the black hole significantly affects the dynamics of PSC. We further observe that standing shock continues to form around the rapidly rotating black holes as well. The calculated shock luminosity and disc luminosity of the models in this thesis are found to match closely with observations. In the final chapter, we have summarized the entire thesis work and also discuss further extension to this work.