

Declaration

*I, **Dhrubajit Kalita**, (Registration No.: TZ202369 of 2021 and Roll No.: PHP18001) hereby declare that the thesis entitled, “**A theoretic investigation of complex astrofluid stabilities in new astroenvirons**”, being submitted to the School of Sciences, Tezpur University, in partial fulfilment of the requirements for the award of degree of **Doctor of Philosophy (PhD)** is a genuine record of original research investigations by me during my PhD period. It is carried out under the guidance of **Prof. Pralay Kumar Karmakar**, Department of Physics, Tezpur University.*

Any part of texts, figures and results by other researchers, which are properly used in dignified way herein, are appropriately and honestly cited in order to give credit to the originators.

I also declare that the works of this thesis have not been submitted in part, or in full, for the award of any other degree, diploma, fellowship, associateship, or any other similar title-recognition from any other academic institute or organization.

Date: 17-05-2023

Place: Tezpur



(Dhrubajit Kalita)

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*This is to certify that the thesis entitled, “A theoretic investigation of complex astrofluid stabilities in new astroenvirons”, submitted to the School of Sciences, Tezpur University, in partial fulfilment of the requirements for the award of degree of Doctor of Philosophy (PhD) in Physics is a genuine record of original research investigations carried out by **Mr. Dhrubajit Kalita** under my constant supervision and guidance.*

All the cooperation and help received by him throughout from various sources have been thankfully acknowledged.

It is further stated that no part of the contents compiled in the thesis has been submitted elsewhere for the award of any other degree, diploma, or recognition.

Date: 17-05-2023

Place: Tezpur

A handwritten signature in purple ink, appearing to read 'P. K. Karmakar'.

(Prof. P. K. Karmakar)

Department of Physics

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I dedicate this thesis to my beloved father and mother

Mr. Ajit Kalita

&

Mrs. Jaymati Kalita

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*Dhrubajit Kalita
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List of abbreviations

Sl. No.	Abbreviation	Full form
1	<i>RBC</i>	<i>Red Blood Cell</i>
2	<i>WBC</i>	<i>White Blood Cell</i>
3	<i>ISM</i>	<i>Interstellar Medium</i>
4	<i>DMC</i>	<i>Dust Molecular Cloud</i>
5	<i>PAH</i>	<i>Polycyclic Aromatic Hydrocarbon</i>
6	<i>DIAW</i>	<i>Dust Ion-Acoustic Wave</i>
7	<i>DAW</i>	<i>Dust Acoustic Wave</i>
8	<i>DCW</i>	<i>Dust Coulomb Wave</i>
9	<i>DLW</i>	<i>Dust Lattice Wave</i>
10	<i>DCDW</i>	<i>Dust Charge Density Wave</i>
11	<i>DTW</i>	<i>Dust Thermal Wave</i>
12	<i>DDW</i>	<i>Dust Density Wave</i>
13	<i>DIW</i>	<i>Dust Ionization Wave</i>
14	<i>GC</i>	<i>Globular Cloud</i>
15	<i>DC</i>	<i>Dark Cloud</i>
16	<i>GMC</i>	<i>Giant Molecular Cloud</i>
17	<i>DDC</i>	<i>Dense Dust Cloud</i>
18	<i>DDMC</i>	<i>Diffuse Dust Molecular Cloud</i>
19	<i>CC</i>	<i>Circus Cloud</i>
20	<i>WC</i>	<i>Weakly Coupled</i>
21	<i>SC</i>	<i>Strongly Coupled</i>
22	<i>GH</i>	<i>Generalized Hydrodynamics</i>
23	<i>QLCA</i>	<i>Quasi-localized charged approximation</i>
24	<i>KH</i>	<i>Kelvin-Helmholtz</i>
25	<i>WIMPs</i>	<i>Weakly Interacting Massive Particles</i>
26	<i>KdV</i>	<i>Korteweg-de Vries</i>
27	<i>VFB</i>	<i>Viscoelastic Forced Burgers</i>
28	<i>g-MHD</i>	<i>Generalized Magnetohydrodynamic</i>
29	<i>LFR</i>	<i>Low-Fugacity Regime</i>
30	<i>HFR</i>	<i>High-Fugacity Regime</i>

31	<i>MB</i>	<i>Maxwell-Boltzmann</i>
32	<i>OLM</i>	<i>Orbit-Limited Motion</i>
33	<i>WCL</i>	<i>Weakly Coupled Limit</i>
34	<i>SCL</i>	<i>Strongly Coupled Limit</i>
35	<i>GNA</i>	<i>Gravito-Nucleo-Acoustic</i>
36	<i>NS</i>	<i>Neutron Star</i>
37	<i>RXTE</i>	<i>Rossi X-Ray Timing Explorer</i>