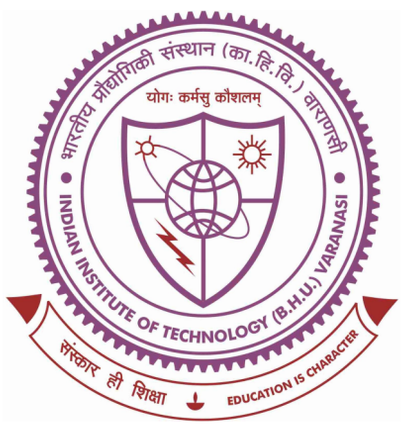
Characterization and Diagnostics of the Localized Flaring Coronae and Their Energetic Responses in Sun-like Stars



Thesis submitted in partial fulfillment for the Award of Degree

Doctor of Philosophy

By

Shweta Didel

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CERTIFICATE

It is certified that the work contained in the thesis titled **Characterization and Diagnostics of the Localized Flaring Coronae and Their Energetic Responses in Sun-like Stars** by **Ms. Shweta Didel** (Roll No. **19171024**), in partial fulfillment of the requirement for the award of the degree of Doctor of Philosophy at the **Indian Institute of Technology (B.H.U.), Varanasi** is a record of his own work carried out under my supervision and guidance and this work has not been submitted elsewhere for a degree.

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Declaration

I, **Shweta Didel** (Roll No. **19171024**), certify that the work embodied in this thesis is my own bonafide work and carried out by me under the supervision of ***Dr.* Abhishekh K. Srivastava** from July 2019 to July 2025 at the *Department of Physics*, Indian Institute of Technology (BHU), Varanasi. The matter embodied in this thesis has not been submitted for the award of any other degree/diploma. I declare that I have faithfully acknowledged and given credits to the research workers whenever and wherever their works have been cited in my work in this thesis. I further declare that I have not wilfully copied any other's work, paragraphs, text, data, results, *etc.*, reported in journals, books, magazines, reports dissertations, thesis, *etc.*, or available at websites and have not included them in this thesis and have not cited as my own work.

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It is certified that the above statement made by the student is correct to the best of my knowledge.

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Dedicated to...

***M*y Loving Family**

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Sincerely

Shweta Didel

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Nomenclature of Symbols

$R_\odot$	Radius of the Sun
$M_\odot$	Mass of the Sun
$L_\odot$	Radiation Luminosity of the Sun
$g_\odot$	Solar gravity
K_B	Stefan-Boltzmann constant
κ	Thermal conductivity
n_e	Number density of electrons
p	plasma pressure
β	plasma beta
$Z_\odot$	Solar abundances
N_H	Hydrogen column density
τ_r	Flare rise time
τ_d	Flare decay time
τ_{rad}	Radiative cooling time scale
τ_{cond}	Conduction cooling time scale
M_{CME}	Ejected mass of the CME
R_0	Rossy Number