

# Certificate

It is certified that the work contained in the thesis titled **Quantum Skyrmions: Quantum Phase Transition, Entanglement Dynamics and Thermodynamics** by **Mr Vipin V**, Roll Number **18171503**, has been carried out under my supervision and that this work has not been submitted elsewhere for a degree.

It is further certified that the student has fulfilled all the requirements of Comprehensive Examination, Candidacy and SOTA for the award of **Ph. D. Degree**.

**Date**

**Supervisor**

**Place**

**Dr. Sunil Kumar Mishra**  
**Associate Professor**  
**Department of Physics**  
**IIT (BHU), Varanasi**



## Declaration

I, **Vipin V**, certify that the work embodied in this thesis is my own bona-fide work and carried out by me under the supervision of **Dr Sunil Kumar Mishra** from 01/01/2019 to 28/04/2025 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 others' work, paragraphs, text, data, results, etc., reported in journals, books, magazines, reports dissertations, theses, etc., or available at websites and have not included them in this thesis and have not cited as my own work.

Date

Signature of Student

Place

**Vipin V**

## Certificate by the Supervisor

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

**Supervisor**

**Head of Department**

**Dr. Sunil Kumar Mishra**  
**Associate Professor**  
**Department of Physics**  
**IIT (BHU)**  
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