

Vishal Tiwari

160 Merrimac Street, New Bedford, MA 02740

✉ vtiwari@umassd.edu ☎ +1 (774) 315-6968



EDUCATION

University of Massachusetts, Dartmouth — Physics Department, Dartmouth, MA

Master of Science, Physics

Advisor: [Dr. Robert Fisher](#)

GPA: 4.00 / 4.00

Sep. 2018 – Current.

International Institute of Information Technology - Hyderabad, Telangana, India

Bachelor of Technology (Honours) & Master of Science in Computer Science and Engineering

MS Thesis: [Geo-Visualization in 4D environment - Simulation of floods over an Urban Area](#)

Advisor: [Dr. K. S. Rajan](#)

Aug. 2010 – Jul. 2015

PUBLICATIONS

- **The Late-Time Light Curves of Single-Degenerate Type Ia Supernovae**, Vishal Tiwari, Or Graur, Robert Fisher, Yossef Zenati, Hagai Binyamin Perets, Oded Papish, Ivo Seitenzahl. (In preparation)
- **Three Dimensional Dynamically Driven Double-Degenerate Double-Detonation Simulations for Type Ia Supernova**, Vishal Tiwari, Robert Fisher, Rahul Kashyap, Pablo Lorén-Aguilar, Enrique García-Berro. (In preparation)

CONFERENCES AND TALKS

- *APS New England 2018 Fall section meeting, November 3, 2018* - Talk on **"Constraining Type Ia Supernovae with Models and Observations of Late-Time Light Curves."**
- *22nd Eastern Gravity Meeting, May 31st, 2019* - Talk on **"Dimensional Dynamically Driven Double-Degenerate Double-Detonation Simulations for Type Ia Supernova."**
- *High Performance Computing Day, UMass Lowell, May 21, 2019* - Poster on **"Three Dimensional Dynamically Driven Double-Degenerate Double-Detonation Simulations for Type Ia Supernova."**
- XSEDE HPC Workshop - Summer Boot Camp - June 3-6, 2019 from Boston University.
- **A Chan Vese based method of texture extraction for automated texture draping of 3D geospatial objects**, 2015 IEEE International Geoscience and Remote Sensing Symposium (IGARSS). July 26-31, 2015; Milan, Italy, Vishal Tiwari, K. S. Rajan

SKILLS & OTHERS

Astrophysical Simulation Tools: FLASH, MESA, GIZMO

Programming Languages/Scripting: C/C++, Fortran, Python, Matlab, Java, Bash, Javascript

Data Analysis and Visualization Tools/libraries: yt, OpenGL, Processing

Debuggers: pdb, Arm DDT, gdb

HPC Skills: MPI, OpenMP

HPC Systems used: TACC-Stampede2, NASA-Pleiades, UMass Dartmouth-Carnie

Nuclear Reaction Networks: Skynet, XNet, Torch

RESEARCH/TEACHING EXPERIENCE

Research Assistant, UMass Dartmouth, MA

Jun. 2019 – Current.

Working on the progenitor problem of Type Ia Supernova

- Continuing the work on late-time light curve study to constraint the progenitors of Type Ia supernova.
- Exploring GIZMO to make new initial conditions for Dynamically Driven Double Degenerate Double Detonation(D6) models for Type Ia.
- Explored XNetFlash, which is a highly paralleled nuclear reaction network which runs across multiple GPUs. We will couple it with our D6 simulation code which will be run on Summit.

First Year Doctoral Fellow, UMass Dartmouth, MA

Sep. 2018 – May. 2019

Worked on the progenitor problem of Type Ia Supernova

- Worked on three dimensional numerical simulations to study the Dynamically Driven Double Degenerate Double Detonation Model for Type Ia supernova.
- Late-time light curve study to constraint the progenitors of Type Ia supernova.

Research Intern, Indian Institute of Astrophysics, India

Nov. 2017 – Mar. 2018

- Worked on x-ray spectral analysis of Low Surface Brightness galaxies.

Teaching Assistant, IIIT-Hyderabad , India

Responsible for taking tutorial sessions, managing assignment portal and grading exams for the following Computer Science courses:

- Principle of Programming Languages Aug. 2013 – Dec. 2013
 - Spatial Informatics Aug. 2014 – Dec. 2014
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WORK EXPERIENCE

Technology Associate — Morgan Stanley, Bangalore, India

Aug. 2015 – Oct. 2016

Worked with the Global Banking Team as a Java developer developing lending based services.

Software Development Intern — HackerRank, Bangalore, India

May. 2014 – Jul. 2014

Worked on expanding width and depth of HackerRank Brahma Api and adding blog support for HackerRank users.

Software Development Intern — Google Summer of Code, 2013

May. 2013 – Aug. 2013

Worked for Open Source Geospatial Foundation (OSGeo).

PHYSICS PROJECTS

Constraining Type Ia Supernova progenitors using Late time Light Curve

Guide: Dr. Robert Fisher

- Late-time light curves provides an independent method to constrain the progenitors of Type Ia supernova. We explored the channel in which the late-time light curve is primarily powered by the slow radioactive decay of ^{57}Co . Using this we compared five near-by events (2012cg, 2011fe, 2015F, 2014J, 2013aa) with single-degenerate and double-degenerate simulation models.

Dynamically Driven Double Degenerate Double Detonation Model for Type Ia

Guide: Dr. Robert Fisher

- We performed three-dimensional simulations of the D6 model using the FLASH code. In this double-degenerate channel, the primary and secondary white dwarfs have thin helium shells, and a detonation in the helium layer of the primary can lead to a second detonation of carbon in primary's core leading to a normal Type Ia.

Gravitational Wave Data Analysis using Deep Neural Network

Guide: Dr. Scott Field

- Working on training a deep convolutional neural network classifier for preprocessing binary black hole systems. We are generating gravitational waveforms using the gwsurrogate models and will be training a CNN on this data as a classifier.

Exploration of Mass Distribution Function of Black holes and Neutron Stars using MESA

Guide: Dr. Robert Fisher

- Worked on calculating a mass distribution function of black holes and neutron stars. Made use of MESA to run one dimensional main sequence to pre-core collapse models to calculate the Fe core mass, Si shell mass. The total remanent mass was roughly estimated from the gas having outward velocities less than the escape velocities. I calculated a total of 100 models using a framework that I wrote, which could run multiple models in parallel on a computer cluster to explore the parameters space of masses and metallicity.
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COMPUTER SCIENCE PROJECTS

Geo-Visualization in 4D environment

Guide: Dr. K. S. Rajan

- Worked on the rendering of large CityGML building data model. We simulated flood using GRASS GIS, and also implemented a depth filling algorithm. This simulated data is given to our visualization framework, which renders a dynamic surface. Our 4D GIS framework is built on top of NASA world wind virtual globe.

Sports Analytics from Broadcast Tennis Videos

Guide: Dr. C. V. Jawahar

- We were analyzing broadcast tennis videos to find player style patterns. First post-processing steps include the extraction of high-level features like ball paths, player location, event detection, court extraction, etc. Basic analysis of players court coverage, balls coverage were carried out.

Google Summer of Code 2013 with OSGeo — Adding Voronoi Diagram to GEOS

Guide: Sandro Santilli

- GEOS(Geometry Engine Open Source) is a port for JTS and the project aims to provide the functionality of constructing Voronoi diagrams to it. Also making a thread safe C-wrapper for the C++ apis that have been ported.