

Solicitation Title: Recurrent Novae and Classical Novae as Supernova Type Ia Progenitors
Solicitation Deadline: January 31st, 2020
Solicitation Sponsor: Dr. Edward M. Sion
Solicitation Funding: External Grant (NASA)

Solicitation Summary:

We are seeking a Villanova undergraduate student (possibly two, contingent upon funding) for a summer research opportunity to analyze and model the far ultraviolet spectra of recurrent novae and classical novae, newly obtained by us, using Hubble Space Telescope, and archival spectra in the Multi-Mission Archive at Space Telescope (FUSE, Galex, IUE). The student determine the rates of accretion onto their near-Chandrasekhar mass white dwarfs, and the temperature, rotational velocity, chemical abundances and mass estimate of the white dwarf star (if exposed) following their return to quiescence after their last previous nova explosion. Spectroscopic clues from their thermonuclear ashes will be used to ascertain whether the white dwarf core is Carbon-Oxygen (hence leading to a Type Ia event) or Oxygen-Neon-Magnesium (accretion-induced collapse leaving a neutron star or black hole stellar remnant).

Solicitation Requirements: The research position is open to all Villanova undergraduates who are majoring in astronomy, physics or a closely related field. Applicants need to provide:

- a current CV that highlights commitment to excellence in the applicant's current field of study;
- a 3-page proposal that discusses the scientific background and proposed work timeline;
- a 1-page narrative on expected outcomes and procedures; and
- a 1-page personal statement that conveys the suitability and interest of the applicant.

To apply for this position, interested students need to submit their applications by the deadline in the form of a single pdf document. Only electronic submissions are accepted; email your applications to edward.sion@villanova.edu. Any applications received after the deadline will be returned without review.

Solicitation Documents:

Introductory background material on the basic astrophysics of compact binaries can be found in the textbook Introduction to Modern Astrophysics, 2nd Edition by B. Carroll and D. Ostlie (Pearson, New York). The following peer-reviewed journal references, may also prove helpful in the preparation of a proposal:

2019, Astrophysical Journal, 872, 68

2019, Astronomical Journal, 158, 99

2017, Astronomical Journal, 153, 89

Solicitation Outcome Announcement:

The review of solicitation material will begin on Feb 1, 2020 and a short-list will be assembled by Feb 14, 2020. The highest-ranking candidate will be informed and offered a position. In the event that the highest-ranking candidate accepts the position, the solicitation will be closed. Otherwise the position will be offered to the next highest ranking applicant until the position is filled.