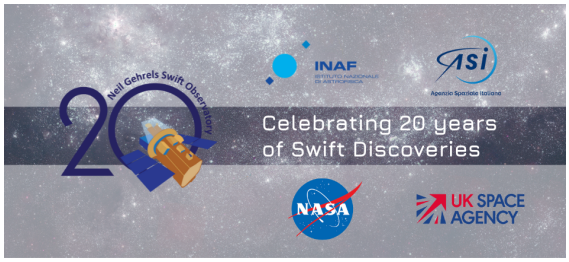

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T Corona Borealis Will Be the Brightest Classical or Recurrent Nova Ever Observed in X-rays

Tuesday 25 March 2025 14:29 (1 minute)

Classical and Recurrent novae occur on the white dwarf component of a close, or not so close, binary system. They participate in the cycle of Galactic chemical evolution in which grains and metal enriched gas in their ejecta are a source of heavy elements for the ISM. Once in the diffuse gas, this material is ultimately incorporated into new regions of star formation. We have continued our hydrodynamic studies by following accretion onto 1.35Msun white dwarfs in order to predict the upcoming explosion of T Corona Borealis (TCRB). TCRB contains a massive, 1.35$M_{\odot}$, white dwarf orbiting a red giant (M3-M4 III) with a 227 day period. It has been observed to explode approximately every 80 years. We do not know the composition of the underlying white dwarf in this system and, therefore, have evolved both carbon-oxygen and oxygen-neon white dwarfs through a thermonuclear runaway and return to quiescence. We have found that (1) such a system ejects sufficient ^{7}Li that, over its total lifetime as a Recurrent Nova it can eject as much ^{7}Li as a Classical Nova; (2) It is ejecting far less mass than accreted and so the white dwarf is growing toward the Chandrasekhar Limit and will explode as either a SN Ia or experience accretion induced collapse; (3) we have followed the evolution of just the white dwarf after the escaping matter has been removed from the simulation and find that days to weeks after the initial outburst the radiating white dwarf will reach luminosities exceeding 10^{5} $L_{\odot}$ and temperatures exceeding 2×10^{6} K. Thus, TCRB, which is at a distance less than a kpc will become, for a short time, the brightest nova ever to be observed in X-rays. T CrB is an excellent candidate for a detailed Swift investigation.

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