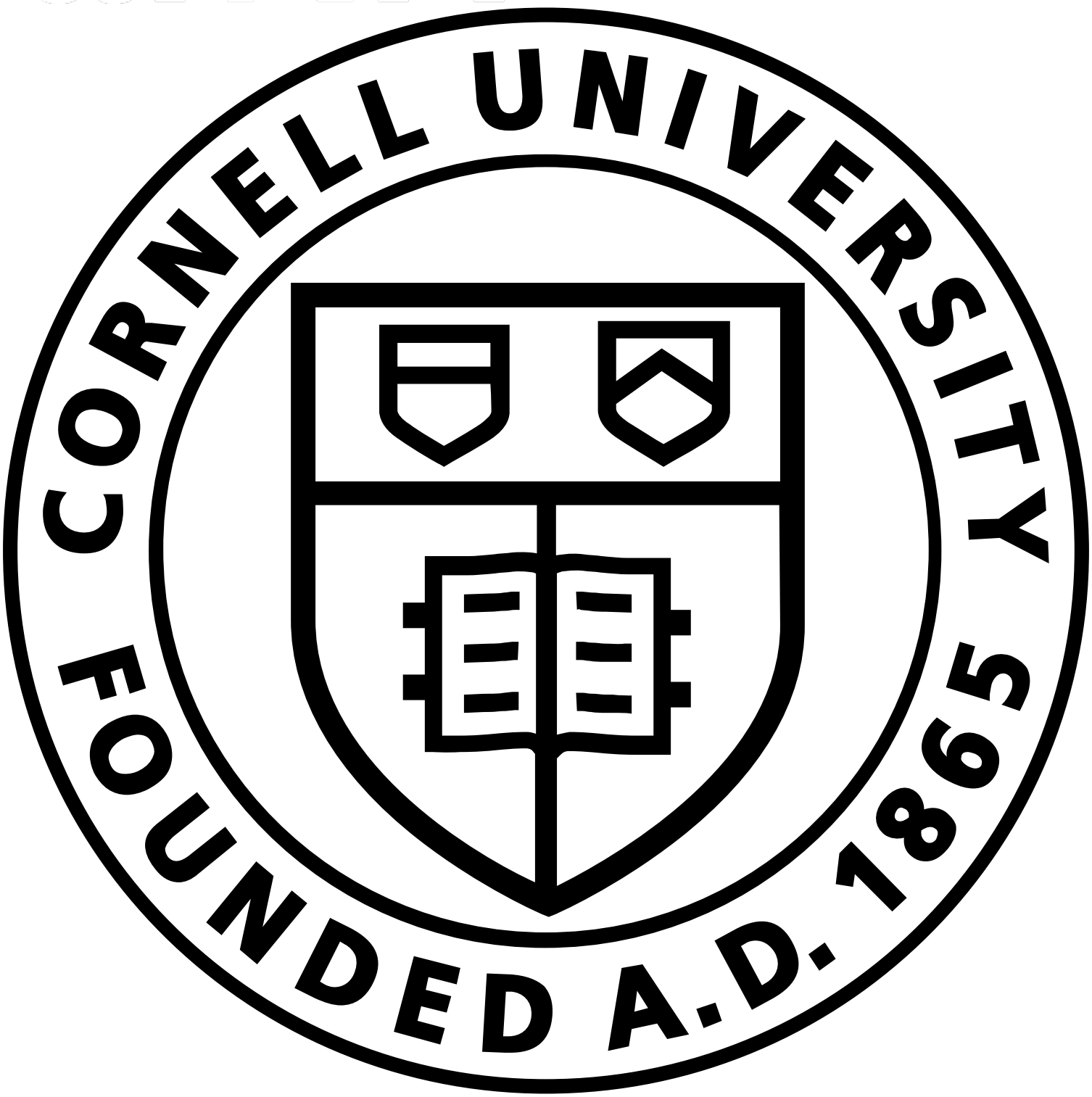
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ASASSN-16oh: A nova outburst with no mass ejection -- A new type of supersoft X-ray source in old populations

Mariko Kato, Hideyuki Saio, Izumi Hachisu

ASASSN-16oh is a peculiar transient supersoft X-ray source without a mass-ejection signature in the field of the Small Magellanic Cloud. Maccarone et al. (2019) concluded that ASASSN-16oh is the first dwarf nova with supersoft X-ray that originated from an equatorial accretion belt on a white dwarf (WD). Hillman et al. (2019) proposed a thermonuclear runaway model that both the X-rays and V/I photons are emitted from the hot WD. We calculated the same parameter models as Hillman et al.'s and found that they manipulated on/off the mass-accretion, and their best fit V light curves are 6 mag fainter, and decay about 10 times slower, than that of ASASSN-16oh. We propose a nova model induced by a high rate of mass accretion during a dwarf nova outburst, i.e., the X-rays originate from the surface of the hydrogen-burning WD whereas the V/I photons are from the irradiated disk. Our model explains the main observational properties of ASASSN-16oh. We also obtained thermonuclear runaway models with no mass ejection for a wide range of parameters of the WD mass and mass accretion rates including both natural and forced novae in low-metal environments of Z=0.001 and Z=0.0001. They are a new type of periodic supersoft X-ray sources with no mass ejection, and also a bright transient in V/I bands if they have a large disk. We suggest that such objects are candidates of Type Ia supernova progenitors because its mass is increasing at a very high efficiency (\sim 100 \%).

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