Hot-Wiring Flare Stars: Optical Flare Rates and Properties from Time-Domain Surveys

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Abstract

Flares are thought to result from the reconnection of magnetic fields in the upper layers (coronae) of stellar atmospheres. The highly dynamic atmospheric response produces radiation across the electromagnetic spectrum, from the radio to X-rays, on a range of timescales, from seconds to days. Due to their high flare rates and energies combined with a large contrast against the background quiescent emission, the low-mass M dwarfs are the primary target for studying flare rates in the Galaxy. However, high-precision monitoring campaigns using Kepler and the Hubble Space Telescope have recently revealed important information on the flare rates of earlier-type, more massive stars. In this talk, I will focus on the properties of flares and flare stars in the optical and near-ultraviolet wavelength regimes as revealed from time-domain surveys, such as the repeat observations of the Sloan Digital Sky Surveys Stripe 82. I will discuss the importance of spectroscopic follow-up characterization of the quiescent and flare emission, and I will highlight new radiative-hydrodynamic modeling results that have enhanced our understanding of impulsive phase U-band flare emission.