M19a Multi-wavelength observations of prominence eruptions on a young solar-type star

Kosuke Namekata, Hiroyuki Maehara (NAOJ), Vladimir Airapetian, Rishi Paudel, Keith Gendreau, Zaven Arzoumanian (NASA), Pascal Petit (Obs. Midi-Pyrenées), Kai Ikuta (U.T.), Satoshi Honda (U.H.), Yuta Notsu (C.U.), Shun Inoue (K.U.), Shin Toriumi (JAXA), Meng Jin (LMSAL), Kyoto's team

Young solar-type (G-type main-sequence) stars are known to exhibit frequent superflares ($>10^{33}$ erg). The XUV flare emission and coronal mass ejections (CMEs) may have profound impacts on atmospheres of young (exo-)planets. Recently, we discovered a blue-shifted Hα "absorption" as the first evidence of a massive and fast filament eruption associated with a superflare on a young solar-type star, EK Dra (G2V, Age$\sim$100 Myr). Here we report a new result of our monitoring observations of EK Dra, performed in April 2022 with the Seimei (Hα), NICER (X-ray), TESS (white light), and TBL (spectropolarimetry). Three superflares (10^{33-34} erg) were detected in all three wavelength bands with two of them showing blue-shifted Hα "emission" components at 400-700 km/s. This implies the detection of two fast prominence eruptions, in contrast to our previous discovery of the filament eruption from EK Dra (Namekata+22a). The temporal changes of the prominence velocity suggest that the direction of one of the eruptions could be $\sim$20 deg to the LOS. X-ray observations do not show signatures of X-ray dimming, which is often associated with solar CMEs, but the upper limits were derived. Simultaneous spot/magnetic field map were performed with TESS&TBL data, which may constrain the location of the eruptive prominences. These first multi-observatory and multi-wavelength observations provide properties of these eruptions that would lead to a more comprehensive understanding of stellar CMEs.