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Superflare of a Sun-like star as observed with XMM-Newton and SRG/eROSITA

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In this work, we studied X-ray source SRGe J021932.4-040154, that we associated with a single X-ray active star of spectral class G2V-G4V and the rotational period $P_{\rm rot} = 3.2 \pm 0.5$ days. The SRGe J021932 was observed with the SRG/eRROSITA during eUDS survey in 2019 in much dimmer state compared to the XMM-Newton catalogue 4XMM-DR12. Detailed analysis revealed that the archival XMM-Newton observations captured the source during a flaring event in 2017. The XMM light curve demonstrates a strong flare described with the Gaussian rise and exponential decay, typical for stellar flares, characterized by timescale of $\sim$ 400 s and $\sim$ 1300 s, respectively. The spectral analysis of the quiescent state reveals $\sim$ 10 MK plasma at luminosity of $(1.4 \pm 0.4) \times 10^{29}$ erg/s (0.3-4.5keV). The spectrum of the flare is characterized by temperature of $\sim$40 MK and luminosity $(5.5 \pm 0.6) \times 10^{30}$ erg/s. The total energy emitted during the flare $\sim 1.7 \times 10^{34}$ erg exceeds the canonical threshold of 10^{33} erg, allowing us to classify the observed event as a superflare on a Sun-like star. We additionally present an upper limit on the starspot area based on the quasi-period modulations of the stellar brightness and an analysis of the observed abundance and luminosity of the star derived from the X-ray spectral fitting.

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