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Investigating Blue Straggler Stars of Open Clusters and Fields using UVIT/AstroSat

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Blue straggler stars (BSS) are anomalous core hydrogen-burning stars that have undergone a rejuvenation by acquiring mass either in a direct stellar collision or through mass transfer in binaries or mergers. We have been surveying the BSS of open clusters and Galactic fields using the Ultraviolet Imaging Telescope onboard the AstroSat telescope. Together in five open clusters (NGC 7789, NGC 2506, NGC 7142, NGC 6940, and NGC 2627) with ages ranging from ~1 Gyr to ~5 Gyr, we studied 33 BSS using the far-UV and near-UV observations from UVIT/AstroSat and GALEX, optical data from Gaia DR2/EDR3/DR3, and IR data from 2MASS, WISE, and Spitzer. Additionally, we studied 27 blue metal-poor stars, the field BSS candidates, using the observations from the above surveys. Based on the best-fit multi-wavelength spectral energy distributions, 15 out of the 33 BSS of the open clusters show more than 50% excess in the UV-flux and are successfully fitted with a double component. Among the field BSS candidates, 12 out of the 27 show UV excess and are successfully fitted with a double component. We present the properties of BSS, field BSS candidates, and their hot companions obtained from the spectral energy distributions. The majority of the ~45% binary BSS and binary field BSS have likely formed as a result of mass-transfer in a binary via Case-A/B or Case-C. In contrast, a few may have formed as a result of mergers or mass-transfer in hierarchical triple systems.

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