Characterization of blue straggler stars in the 35th anniversary of the *International Ultraviolet Explorer*

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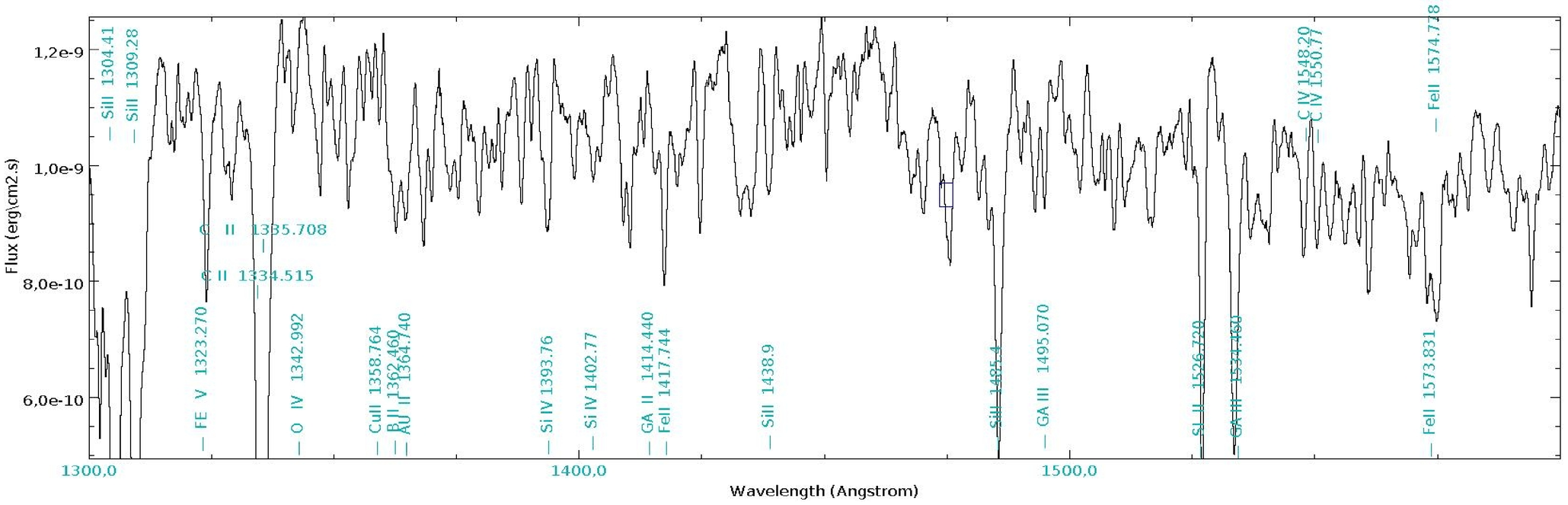
Abstract: Sixty years after the discovery of the first blue straggler stars (BSSs) by Allan Sandage, there is still no general consensus on their origin. In this poster, we look for spectral features in the wavelength range covered by the International Ultraviolet Explorer (IUE; 115-320 nm) that make different BSSs from normal stars. In particular, we have selected 19 bright BSSs in open clusters (e.g. Hyades, Pleiades) with late-O to A spectral types and compared them with a large sample of comparison normal stars and chemically-peculiar stars of the same spectral types. To accomplish that, we downloaded high-resolution INES IUE Newly Extracted Spectra and analysed them in detail. After investigating and comparing the most intense lines and features typical in BSSs and peculiar Ap and Bp stars (e.g. silicon, aluminium, berillium, boron, gallium), we have found no clear evidence of spectroscopic differences between BSSs and normal stars in the IUE spectral range.

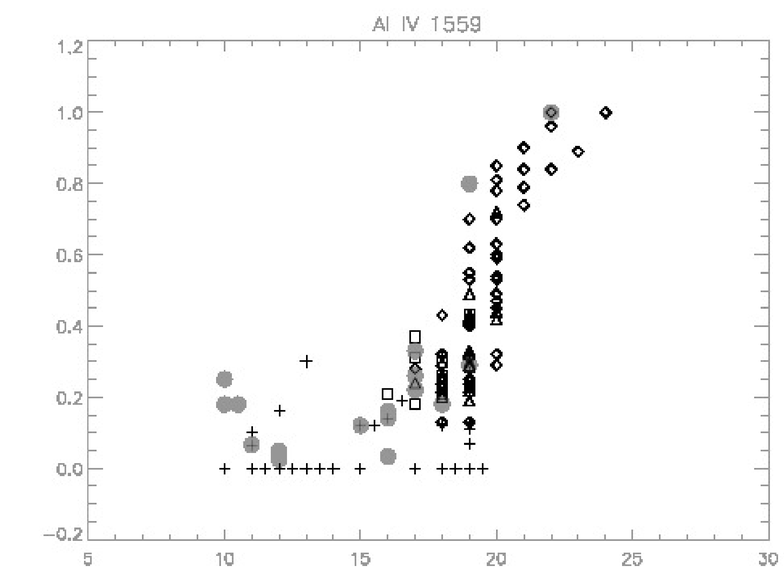
The *International Ultraviolet Explorer*:The International Ultraviolet Explorer has been a satellite working like an astronomical observatory. It was a joint project between NASA, ESA and PPARC (formerly SERC). Launched on January 1978, it has been observing succesfully until 1996. It has been the first space observatory operated in real time by astronomers. More than 100,000 spectra have been taken during this 18 years of operation. IUE had two spectrographs covering wavelengths from 115 to 200 nanometres and 185 to 330 nm respectively and both of them could be used either in high or low resolution modes with spectral resolutions of 0.02 and 0.6 nm respectively. Observing with apertures of 3" or of 10"x20" for point-like or extended objects was possible.

Stellar sample and spectroscopic data: In the course of a work on interstellar reddening (Morales et al. 2012, sent to A&A) we have accumulated a big number of spectra of peculiar stars, including chemically peculiar stars and blue stragglers as well as of O,B and A Main Sequence normal stars. We have IUE spectra for a sample of BSS from open clusters, stellar associations and field BSS; 77 were observed in low resolution and a subsample of 19 BSS observed in high resolution.
In this preliminary work we present spectroscopic data of B and A BSS of this sample as well as comparison with 266/60 low/high res. normal B stars, 183/54 low/high res. normal A stars and 268/94 low/high res. well-known Ap or Am star from the "General Catalogue of Ap and Am stars" (Renson+ 2009)..

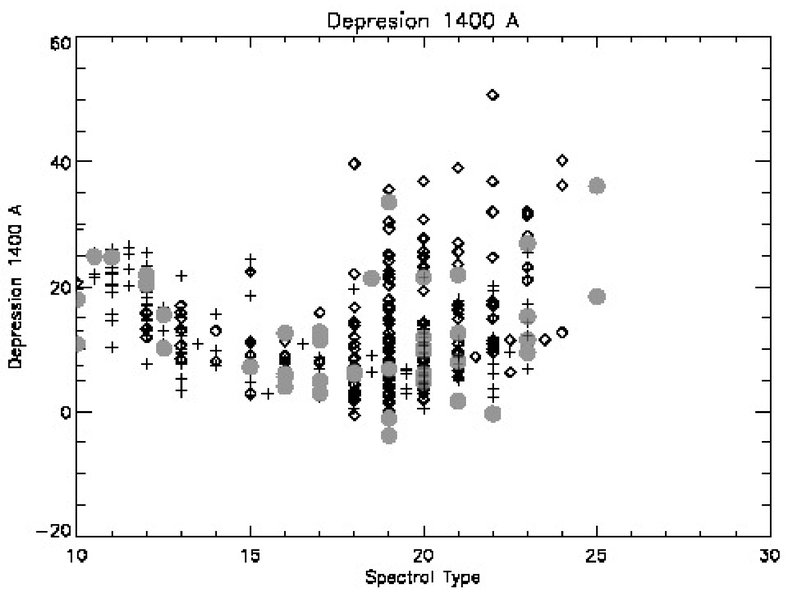
INES: INES is the current database of IUE spectral observations. INES stands for "IUE Newly Extracted Spectra". This data server provides access to IUE Final Archive data, processed with the INES system. It was developed by the ESA IUE project at ESAC and is maintained and distributed by CAB, the Principal Centre for INES data.
http://sdc.laeff.inta.es/cgi-ines/IUEdbsMY

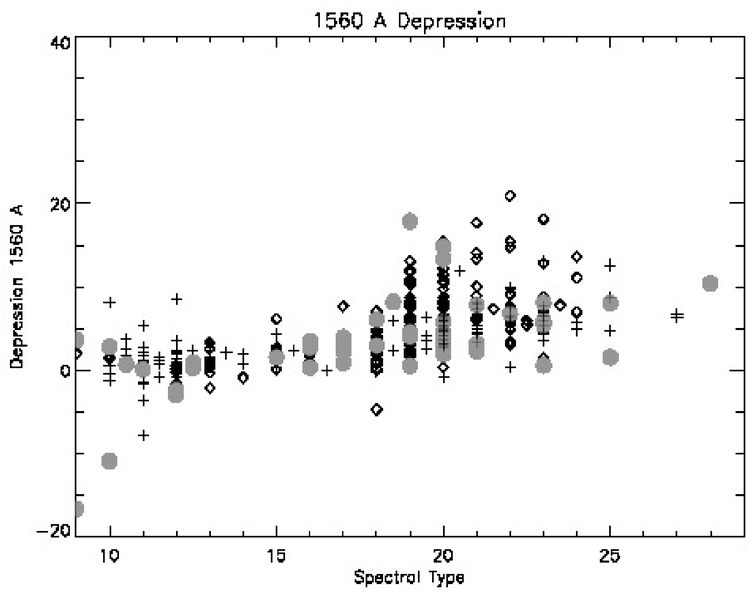


Spectral comparison: We show here the mean of 10 high resolution spectra of the well known BS HD23630 from Melotte 22. The more conspicuous lines have been identified with the help of NIST and of different previous works of ultraviolet spectral lines(Artru & Lanz, 1987,A&A,182,273,Fuhrmann, 1989, Hubrig, S. et al., Takada et al (1986) ApJ 304,425,Sodakane, et al (1983) ApJ,274,261 , and others).We have not found any genuine UV spectral feature in the spectra of BSS different from the ones present in normal and Ap stars.



Lines in high resolution: One of the lines that show more differences between spectral groups is the line at 1559 A tentatively identified as Al IV at NIST or Fe III by Brown et al (1984). We show here the results from our comparison of the equivalent widths between BSS, normal and Ap stars. We have computed equivalent widths from the coadded mean of the best quality high resolution spectra of every star. We have used two different methods fro computing the EW, one assuming gaussian line profiles and also trough the trapezoid approximation and the result is rejected when the area difference of the two approximations is greater than 10%. In most cases both methods give consisten results. The obtained EW are plotted in this figure: grey circles represent the BSS, diamonds represents CP2 stars (ApSi), triangles represent CP3 stars(Hg-MN) and open squares represents CP4 stars (Hewk), according to Preston(1974ARA&A,12,257) peculiar stars classification.





Depressions in low resolution: In low resolution we have quantified the three ultraviolet depressions found in Ap stars at 1400, 1560 and 1770 A. They are similar to the 5200 depression of Ap stars in the visible. The 1400 A depression is produced by autoionization levels of SiII (Artru,1986,A&A,168,L5) and the results for the depression at 1560 A, also atributed to SiII by Lanz et al. (1996). Also here we can see a certain tendency of BSS (grey dots) to have bigger values of the 1400 A depression than normal stars marked with crosses and more or less of the same intensity as peculiar stars (marked with diamonds).
Th effect for the 1560 depression it is less pronounced.