

# FUSE Observations of the UV-Bright Star vZ 1128 in the Globular Cluster M3



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## 1. Astrophysical Background

- vZ 1128 is a member of the globular cluster M3 (see Figure 1).
- vZ 1128 is the brightest star in M3 at ultraviolet wavelengths (see Figure 2).
- vZ 1128 is classified as a UV-bright star (Zin et al. 1972, A&A, 18, 390).
- UV-bright stars in globular clusters lie above the horizontal branch (HB) (Zin et al.) (see Figure 3).
- vZ 1128 is a post-asymptotic giant branch (PAGB) star (Dixon et al. 1994, AJ, 107, 1388).
- The atmospheric parameters of vZ 1128 are  $T_{\text{eff}} = 35,000$  K and  $\log g = 4.0$  (Dixon et al.).
- Abundance determinations of PAGB stars can provide insights into stellar nucleosynthesis on the AGB.

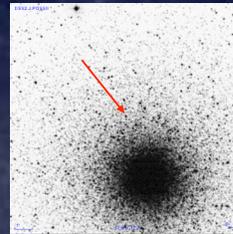


Figure 1 - Digitized image from the second Palomar Sky Survey showing the globular cluster M3 in the blue passband. The arrow indicates the position of vZ 1128.

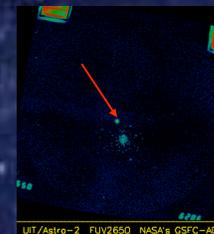


Figure 2 - Ultraviolet Imaging Telescope (UIT) image of M3 (FUV2650). The image was obtained with the fac-UV B1 filter, which has an effective wavelength of 1521 Å with a FWHM of 354 Å. The star vZ 1128 is the brightest object observed in this passband.

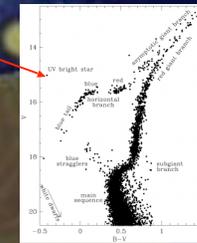


Figure 3 - Color-magnitude diagram for M3. The position of vZ 1128 is indicated by an arrow. [From Mochler (2001, PASP, 113, 1162) who used data published in Buonanno et al. (1994, A&A, 290, 69)]

## 2. FUSE Observations of vZ 1128.

- vZ 1128 was observed through the program P101 aimed at understanding the OVI absorption in the Galactic halo. Howk, Sembach, & Savage (2003, ApJ, 586, 249) have analyzed the line of sight in the direction of vZ 1128 using the FUSE observations.
- The FUSE observations were obtained using the large slit (LWRS). The total exposure time is 33 ksec.
- Figure 4 shows the FUSE spectrum of vZ 1128. The photospheric lines detected in the atmosphere of vZ 1128 are identified above the spectrum.
- Table 1 gives the atomic parameters of the photospheric lines detected in vZ 1128. The observed equivalent width for each line is given in the last column of Table 1.

Table 1 - Parameters for Lines in the FUSE Spectrum of vZ 1128									
Wavelength (Å)	Ion	Transition	g <sub>l</sub>	g <sub>u</sub>	λ <sub>rest</sub> (Å)	λ <sub>obs</sub> (Å)	λ <sub>rest</sub> (Å)	λ <sub>obs</sub> (Å)	EW (Å)
912.1	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	912.1	912.1	912.1	912.1	0.15
912.3	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	912.3	912.3	912.3	912.3	0.15
912.5	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	912.5	912.5	912.5	912.5	0.15
912.7	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	912.7	912.7	912.7	912.7	0.15
912.9	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	912.9	912.9	912.9	912.9	0.15
913.1	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	913.1	913.1	913.1	913.1	0.15
913.3	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	913.3	913.3	913.3	913.3	0.15
913.5	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	913.5	913.5	913.5	913.5	0.15
913.7	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	913.7	913.7	913.7	913.7	0.15
913.9	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	913.9	913.9	913.9	913.9	0.15
914.1	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	914.1	914.1	914.1	914.1	0.15
914.3	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	914.3	914.3	914.3	914.3	0.15
914.5	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	914.5	914.5	914.5	914.5	0.15
914.7	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	914.7	914.7	914.7	914.7	0.15
914.9	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	914.9	914.9	914.9	914.9	0.15
915.1	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	915.1	915.1	915.1	915.1	0.15
915.3	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	915.3	915.3	915.3	915.3	0.15
915.5	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	915.5	915.5	915.5	915.5	0.15
915.7	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	915.7	915.7	915.7	915.7	0.15
915.9	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	915.9	915.9	915.9	915.9	0.15
916.1	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	916.1	916.1	916.1	916.1	0.15
916.3	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	916.3	916.3	916.3	916.3	0.15
916.5	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	916.5	916.5	916.5	916.5	0.15
916.7	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	916.7	916.7	916.7	916.7	0.15
916.9	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	916.9	916.9	916.9	916.9	0.15
917.1	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	917.1	917.1	917.1	917.1	0.15
917.3	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	917.3	917.3	917.3	917.3	0.15
917.5	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	917.5	917.5	917.5	917.5	0.15
917.7	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	917.7	917.7	917.7	917.7	0.15
917.9	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	917.9	917.9	917.9	917.9	0.15
918.1	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	918.1	918.1	918.1	918.1	0.15
918.3	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	918.3	918.3	918.3	918.3	0.15
918.5	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	918.5	918.5	918.5	918.5	0.15
918.7	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	918.7	918.7	918.7	918.7	0.15
918.9	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	918.9	918.9	918.9	918.9	0.15
919.1	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	919.1	919.1	919.1	919.1	0.15
919.3	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	919.3	919.3	919.3	919.3	0.15
919.5	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	919.5	919.5	919.5	919.5	0.15
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919.9	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	919.9	919.9	919.9	919.9	0.15
920.1	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	920.1	920.1	920.1	920.1	0.15
920.3	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	920.3	920.3	920.3	920.3	0.15
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920.7	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	920.7	920.7	920.7	920.7	0.15
920.9	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	920.9	920.9	920.9	920.9	0.15
921.1	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	921.1	921.1	921.1	921.1	0.15
921.3	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	921.3	921.3	921.3	921.3	0.15
921.5	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	921.5	921.5	921.5	921.5	0.15
921.7	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	921.7	921.7	921.7	921.7	0.15
921.9	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	921.9	921.9	921.9	921.9	0.15
922.1	Si IV	4p <sup>2</sup> 3P <sup>o</sup> - 4p 3P	15	20	922.1	922.1	922.1	922.1	0.15
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