

A New Common Proper Motion Pair in Crater

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Abstract: Presented in this paper is the discovery and observation of a new double star pair in Crater, currently not included in the WDS catalog. The components have a mean PM of $62.2 \pm 3.0 \text{ mas yr}^{-1}$ and exhibit particular kinds of photometric and astrophysical properties which suggest they might be physically associated.

This new pair is located $2^{\circ}.6$ north of the fifth-magnitude orange star ϵ Crateris and is within a couple of degrees of the well-known double stars Burnham 600 (WDS 11170 – 0708) and Struve 1530 (WDS 11197 – 0654) in the same region of sky (Figure 1).

Positional and Photometric Analysis

The primary has the designation BD-06° 3368, is located at ICRS: 11 22 45.024 -07 26 21.19, and is of V mag 9.6. The companion appears at least one magnitude dimmer, at V mag ~ 10.6 . Measurements on high resolution J-band imagery taken from 2MASS yielded



Figure 1: Location of the identified new pair in Crater [Image credit: Stellarium]

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Table 1: Proper Motion of the Components

	μ_{α} (mas yr ⁻¹)	Error (mas yr ⁻¹)	μ_{δ} (mas yr ⁻¹)	Error (mas yr ⁻¹)
Primary	+15.7	± 3.3	-57.5	± 3.0
Companion	+21.2	± 3.3	-61.3	± 3.0

Table 2: J and K magnitudes and color indices

	J-mag	K-mag	Color Index (J-K)
Primary	9.523	9.111	+0.412
Companion	10.582	10.041	+0.541

Position Angle (θ) = 38°.6 (ep 1997.0465) and Separation (ρ) = 11".83 (ep 1997.0465).

The PPMXL Catalog [1] revealed the components to be sharing common proper motions, as shown in Table 1.

As highlighted in an earlier paper [2], there exists a broad inverse correlation between distance and proper motion which may be taken as a preliminary pointer for gauging the likely order of distance at which a proven (or probable) binary system might reside. Based upon that scale, a total PM of this pair of 62.2 ± 3.0 mas yr⁻¹ suggests the pair are located at a distance of about 100 to 200 ly (30 to 60 pc) from the Earth.

Near-infrared J and K-band photometry, taken from 2MASS [3], are shown in Table 2.

These 2MASS (J – K) color indices would tentatively categorize the components as two orange stars of spectral classes in the region of ~K2 and ~K8, respectively [4]. Interstellar reddening in the J and K magnitudes would perhaps be negligible for this particular pair, as they are positioned at a high galactic latitude of +49° on the celestial sphere and are not too far away in distance for interstellar absorption of their light rays to become significant.

Considering their observed visual brightnesses and a projected distance in the region of somewhere around 100 to 200 ly away (based on PMs), the components are both likely to be main-sequence dwarves of spectral types in the region of ~K2V and ~K8V, respectively. On these assumptions, the primary is likely to be of absolute magnitude around +7 and applying the distance mod formula to its apparent mag of +9.6 yields a more refined spectral distance of just 108 ly (33 pc) for the pair. Supposing that this system is in fact located at

this precise distance of 108 ly away, the components would have a physical separation of 392 AU, which would certainly be close enough for them to gravitationally hold together as a binary pair.

Conclusions

From the observations, the astrometry and astrophysical analysis of this pair presented in this paper, it seems that this is a good candidate for being a prospective binary star.

Acknowledgments

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References

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