A Test of LaTeX

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1 Abstract

This analysis combined data collected from multiple photmetric and spectroscopic observations and tecniques from decades of scientific papers[?][?] to create code that estimates the distance to the SN1987a-like supernova, SN2018hna. The analysis concludes that the derived distance, between 13-15 Mpcs, is within acceptable range of other estimates and confirms the accuracy of the data and method.

2 Introduction

The distance between us and the stars above was a mystery to ancient astronomers. Not knowing the true unfathomable distance, they assumed the stars were just points of light in a cosmic dome that surrounded and rotated around the earth, the "center of the universe". It took centuries of free thinkers to finally accept that we arent the center of the universe, and that stars are in fact just like our own sun, just very far away. It took longer still to determine how far away those stars actually were. Today, we have developed many techniques to solve this very problem. The techniqe I will be using in this paper to determine the distance to a supernova is called the Expanding Photosphere Method (EPM). It involves the expanding envelope of gas around the supernova, a calculated speed of the expansion, the temperature among other

3 Equations

$$\sin\theta = \frac{R}{d} \tag{1}$$

If θ is significantly smaller than 1, then $\sin\theta = \theta$

$$\theta = \frac{R}{d} \tag{2}$$

References

[1] Thomas A. Matthews and Allan R. Sandage. Optical Identification of 3C 48, 3C 196, and 3C 286 with Stellar Objects. *The Astrophysical Journal*, 138:30, July 1963. ADS Bibcode: 1963ApJ...138...30M.

[2] R. C. Mitchell, B. Didier, S. Ganesh, K. Acharya, R. Khadka, and B. Silwal. Locating Type II-P Supernovae Using the Expanding Photosphere Method. I. Comparing Distances from Different Line Velocities. *The Astrophysical Journal*, 942:38, January 2023. ADS Bibcode: 2023ApJ...942...38M.