

Anchors for the cosmic distance scale: the Cepheid QZ Normae in the open cluster NGC 6067

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Abstract Cepheids are key to establishing the cosmic distance scale. Therefore it's important to assess the viability of QZ Nor, V340 Nor, and GU Nor as calibrators for Leavitt's law via their purported membership in the open cluster NGC 6067. The following suite of evidence confirms that QZ Nor and V340 Nor are members of NGC 6067, whereas GU Nor likely lies in the foreground: (i) existing radial velocities for QZ Nor and V340 Nor agree with that established for the cluster ($-39.4 \pm 0.2(\sigma_{\bar{x}}) \pm 1.2(\sigma)$ km/s) to within 1 km/s, whereas GU Nor exhibits a markedly smaller value; (ii) a steep velocity-distance gradient characterizes the sight-line toward NGC 6067, thus implying that objects sharing common velocities are nearly equidistant; (iii) a radial profile constructed for NGC 6067 indicates that QZ Nor is within the cluster bounds, despite being $20'$ from the cluster center; (iv) new *BVJH* photometry for NGC 6067 confirms the cluster lies $d = 1.75 \pm 0.10$ kpc distant, a result that matches Wesenheit distances computed for QZ Nor/V340 Nor using the Benedict et al. (Astron. J. 133:1810, 2007, HST parallaxes) calibration. QZ Nor is a cluster Cepheid that should be employed as a calibrator for the cosmic distance scale.

Keywords Stars · Variables · Cepheids

1 Introduction

Cepheid variables are crucial for defining the cosmic distance scale, determining the Hubble constant (H_0), and mit-

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