

THE MAIN SEQUENCE OF THE VERY OLD GLOBULAR CLUSTER NGC 6397

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We present photographic photometry for 1135 stars in the globular cluster NGC 6397, which, at a distance of 2.4 kpc, is most likely the second nearest globular to the Sun. The Racine wedge with the CTIO Yale 1 m telescope ($\Delta m = 3.60$ mag), the CTIO 4 m telescope ($\Delta m = 6.83$ mag) and the ESO 3.6 m telescope ($\Delta m = 3.87$ mag) was used to extend the photoelectric calibration from $V \approx 16.1$ to $V \approx 20.7$. The main sequence turnoff at $V = 16.7$ and $B - V = 0.52$ with respectively $M_V = 4.30$ and $(B - V)_0 = 0.36$ yields $(m - M)_V = 12.40$ and $E(B - V) = 0.16$. Using the models^o of Iben and Rood (1970) and the isochrones of Demarque and McClure (1977), we deduce the cluster's age to be 17×10^9 years. This makes this object the oldest of the nine globular clusters with age determination and gives a lower limit to the age of the universe, rendering $H_0 \leq 57 \text{ km sec}^{-1} \text{ Mpc}^{-1}$ if $q_0 \geq 0$ is assumed. The large age spread of 6 billion years between NGC 6397 and 47 Tuc (the youngest counterpart with age data) indicates both that the protogalaxy underwent a slow collapse phase and that the abundances in globular clusters are lower for the oldest. The fact that the galactocentric distances for these clusters have the narrow range of $6 < R < 13$ kpc makes it highly important to secure age data for extremely metal poor globulars far out in the halo.