THE HALO METALLICITY DISTRIBUTION

J. B. LAIRD
Bowling Green State University
Department of Physics and Astronomy
Bowling Green, OH 43403
USA

B. W. CARNEY
University of North Carolina
Department of Physics and Astronomy
CB 3255 Phillips Hall
Chapel Hill, NC 27599–3255
USA

D. W. LATHAM
Harvard-Smithsonian Center for Astrophysics
60 Garden Street
Cambridge, MA 02138
USA

The field dwarf sample is from the original Carney-Latham survey plus its recent extension to about 500 additional stars, a total of about 1450 stars. We have chosen a conservative criterion to isolate halo stars, namely retrograde orbits in the Galaxy, to minimize contamination by thin and thick disk stars, giving a halo sample of 144 stars.

The observed field dwarf sample is consistent with the simple model at the metal-poor end; there is no lack of very metal-poor stars. However, the observed sample has more metal-poor stars than predicted. A metal-rich excess persists even if the sample is limited to stars having $V < -250$ or -300 km/s, in which case contamination by disk stars is probably minimal.

The metallicity distribution of halo globular clusters shows a difference from the field dwarfs which is statistically significant. For a restricted sample of 49 halo clusters, a K-S test gives a 97% confidence level, with the largest difference occurring in the metal-poor tail. If the actual number of halo clusters is actually larger than 49, which seems likely, then the true difference is actually much worse since no additional extremely metal-poor clusters are known.

Monte-Carlo simulations of the cluster sample from a simple model distribution show that there is only a 0.1% chance that a sample of 49 objects would contain only 2 or fewer objects having $\log z < -2.3$; the present cluster sample has only one. We conclude that the lack of very metal-poor clusters is statistically significant.

https://doi.org/10.1017/S0074180900121126 Published online by Cambridge University Press