THE RADII OF THE WHITE DWARF STARS

By S. Chandrasekhar and L. R. Henrich

In this paper we consider models for white dwarfs which have a core devoid of hydrogen surrounded by envelopes containing hydrogen to the extent of 50 per cent (by numbers). We find, for example, that a model for Sirius B can be constructed which has a core devoid of hydrogen containing about 15 per cent of the mass of the star and extending to about a fifth of its radius. Further, the entire configuration is degenerate. The mass of the core thus determined is in agreement with what we would expect on the basis of certain ideas of Schenberg and Chandrasekhar on the evolution of the main sequence stars. For, according to them there is an upper limit (10 per cent) to the fraction of the total mass of a star which can be gradually burned from the center outwards by the continued operation of the carbon cycle.

THE GLOBULAR CLUSTER NGC 5053

By James Cuffey

NGC 5053, a globular cluster remarkable for its resemblance to the open clusters in the resolution of its stars, even at its very center, has been investigated photometrically on plates taken with the 36-inch reflector of the Goethe Link Observatory. Red color indices to a limiting magnitude 16.0 were obtained for 165 stars in the central region of the cluster.

The color-magnitude relation, while unusual in form, shows very little dispersion, and some of its features resemble those found in Messier 3, Messier 13, and Messier 68. The giant branch begins at \( m_r = 13.7 \), \( C_r = 1.5 \), and becomes steadily bluer as far as \( m_r = 15.0 \), \( C_r = 0.9 \). At this point, two distinct branches appear, one of which extends sharply toward the blue (from \( m_r = 15.5 \), \( C_r = 0.8 \), to \( m_r = 15.9 \), \( C_r = 0.25 \)), and the other, more gradually toward the red (from \( m_r = 15.3 \), \( C_r = 0.9 \), to \( m_r = 16.0 \), \( C_r = 1.2 \)). Seven variable stars, found by Baade, are closely grouped near the beginning of the white branch, near \( m_r = 15.6 \), \( C_r = 0.7 \). There are nine stars scattered among the variables, but they do not appear to vary, judging from the relatively few plates at my disposal.

Distance estimates were obtained by comparing the color-magnitude relation in NGC 5053 with those of Messier 3, Messier 13, and Messier 68. A distance of 16,000 parsecs seems most probable, and the presence of the normal number of extra-galactic nebulae, or possibly a slight excess, makes correction of this value for absorption seem unnecessary.