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ABSTRACT. The southern sky gives us the great opportunity to observe two among the brightest and nearest globular clusters of the Galaxy: ω Cen and 47 Tuc. For these giant clusters, we present the comparison between observations and King-Michie multi-mass dynamical models with anisotropy in the velocity dispersion. A more comprehensive description of this work is to be published (Meylan 1986a,b).

1. THE OBSERVATIONS

The present dynamical description uses both surface brightness and velocity dispersion profiles. Precise radial velocities have been obtained with the photoelectric spectrometer CORAVEL at the European Southern Observatory at Cerro La Silla, Chile, in collaboration with astronomers in Geneva, Marseilles, Copenhagen, and ESO (Mayor *et al.* 1983, 1986). The number of observations amounts in ω Cen to 540 measurements of 318 member stars, and in 47 Tuc to 371 measurements of 272 member stars, with typical uncertainties of 0.9 and 0.6 km/s, respectively.

2. THE MODEL

Models have been constructed in an approach nearly identical to Gunn and Griffin (1979). Heavy remnants (e.g. neutron stars), white dwarfs, and MS stars have been distributed into ten different subpopulations, each obeying the energy-angular momentum distribution function: $f_i(E, J) \propto [\exp(-A_i E) - 1] \exp(-\beta J^2)$. In the cluster center, thermal equilibrium is assumed in order to force A_i to be proportional to the mean mass of the stars in the subpopulation considered. A model is specified by a mass function exponent x , and by four parameters: the scale radius r_c , the scale velocity v_s , the central value of the potential W_0 , and the anisotropy radius r_a . Beyond r_a , the velocity dispersion tensor is mostly radial.

3. THE RESULTS

Models have been calculated for a wide range of values of each parameter.

For ω Cen, the observations are well fitted only by models with strong anisotropy, with $r_a \simeq 2-3 r_c$ (Fig. 1). This is related to the large half-mass relaxation time $t_{rh} \simeq 20-30 \cdot 10^9$ yr ($t_r(0) \simeq 10^9$ yr). The mean value of the exponent x of the mass

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function is $\simeq 1.25$, close to Salpeter's 1.35. The heavy remnants represent from 0 to 9 % of the total mass, being anticorrelated with the white dwarfs. The mean total mass of the cluster is about $4 \cdot 10^6 M_{\odot}$, giving a mean $M/L_V \simeq 3$.

In 47 Tuc, using the flat luminosity function of Harris and Hesser (1985 HH), the best models (Fig. 2) have an anisotropy radius $r_a \simeq 20\text{-}40 r_c$. The high concentration involves $t_{rh} \simeq 3 \cdot 10^9$ yr ($t_r(0) \simeq 10^7$ yr). Heavy remnants are not needed, in contrast to white dwarfs which represent always about 30% of the mass. The mean total mass is about $0.7 \cdot 10^6 M_{\odot}$, giving a mean $M/L_V \simeq 1.8$.

REFERENCES

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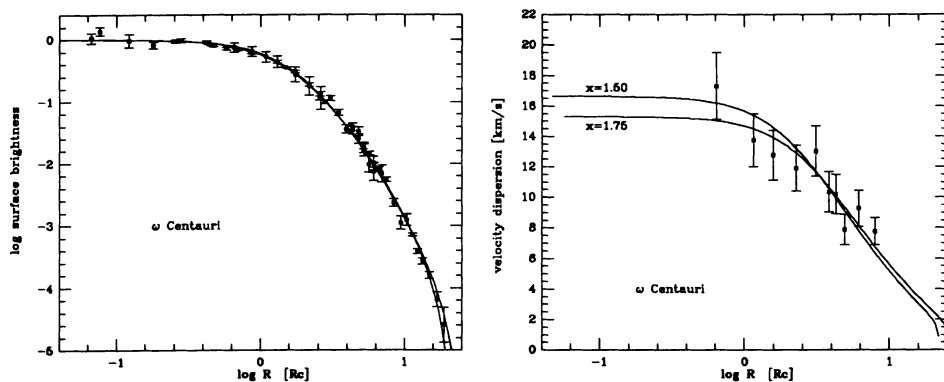


Fig. 1 ω Cen: observed and computed surface brightness and velocity dispersion profiles, for the models with $m_{hr} = 2.0$, $x = 1.50$ and 1.75 , $W_o = 8.5$, and $r_a = 3.0$.

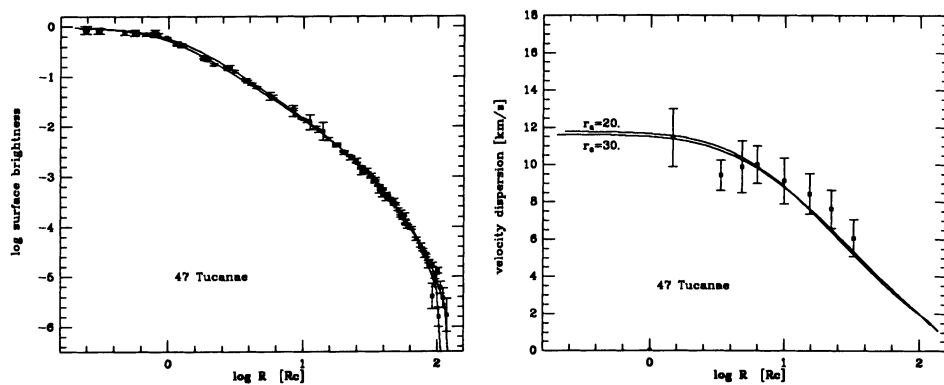


Fig. 2 47 Tuc: observed and computed surface bright. and velocity disp. profiles, for the models with $m_{hr} = 1.4$, $x = \text{HH}$, $W_o = 10$. and 9.5 , and $r_a = 30$. and 20 .