study of M3). Radial velocities with an accuracy better than 1 km/s (about one tenth of typical internal motions in a globular cluster) are determined despite the relative faintness of these stars. This gives access, for example, to an understanding of the behaviour of the velocity dispersion as a function of the distance to the centre, to details of the field of rotation and to a search for spectroscopic binaries.

The latter, formed by dissipative two-body tidal capture or by three-body encounters, play an essential role in the dynamical evolution of a self-gravitating system. Depending on the formation mode, binaries can give up energy to passing stars, becoming more and more tightly bound. The energy made available may slow down or even reverse the collapse of the core.

Accurate Radial Velocities thanks to CORAVEL

Set up at the Cassegrain focus of the 1.5 m Danish telescope at La Silla, the CORAVEL photoelectric spectrometer provides high-quality radial velocities (Baranne et al. 1979, *Vistas in Astronomy,* **23,** 279).

The mean accuracy per measurement is 0.6 and 0.9 km/s for 47 Tuc and ω Cen respectively. More than 600 radial velocity measurements of stars, mainly between B mag 13 and 15, have been carried out through collaboration between observers from ESO, the Copenhagen, Marseilles and Geneva Observatories (Mayor et al, 1983, *Astron. Astrophys. Suppl.* **54,** 495).

The kinematical and dynamical description given below was obtained through the mean radial velocities of 298 member stars in ω Cen and 192 member stars in 47 Tuc. These stars are uniformly distributed from the centres to 9.3 core radii for ω Cen and to 30.5 for 47 Tuc.

King's concentration parameters $c = \log (r_t/r_c)$, logarithm of the ratio of the tidal radius r_t to the core radius r_c, for these two clusters underline their important differences of structure: ω Cen is a rather loose cluster with $c = 1.36$, $r_c = 2.4$ arcmin, $r_t = 55$ arcmin, whereas 47 Tuc shows a strongly condensed core with $c = 2.03$, $r_c = 0.47$ arcmin and $r_t = 50$ arcmin. This structural disparity involves immediate consequences on the observation of individual stars in the central regions: there is no problem of identification of stars in ω Cen even inside one core radius but for 47 Tuc the high central brightness saturates all the photographic plates. Nevertheless, since the acquisition of very central radial velocities is essential for determining the maximum of the rotation law as well as for obtaining the real central velocity dispersion, an IR plate of the nucleus of 47 Tuc (Lloyd Evans, 1974) was used to identify central stars. We were extremely lucky to discover that, by decreasing the gain of the TV monitor at the 1.5 m Danish telescope, the inner part of this cluster appeared very similar to the IR chart (Fig. 1), thus making the measurement of radial velocities of individual stars feasible.

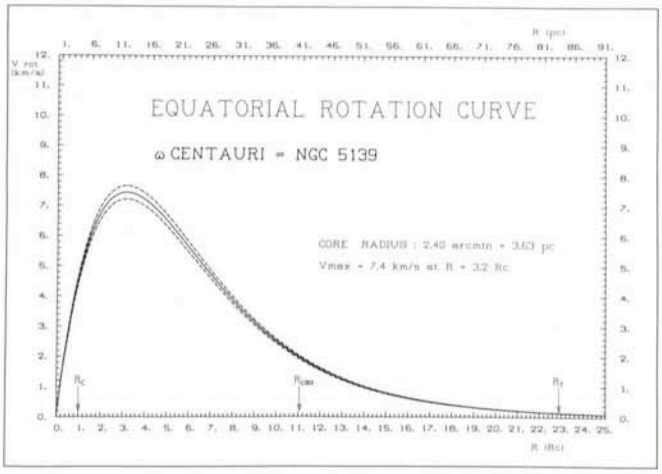

Fig. 2: *Equatorial rotation curve of ω Cen deduced from radial velocities of 298 individual stars (under the hypothesis that the cluster is viewed equator-on).*

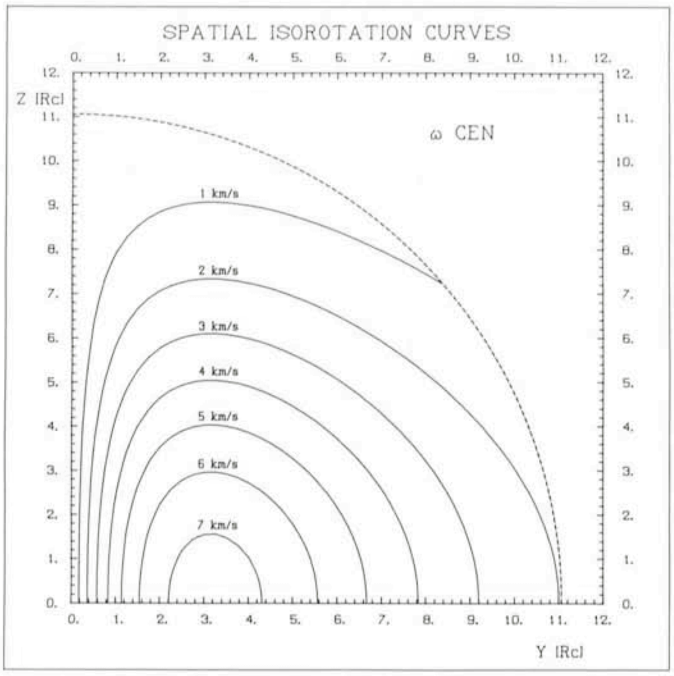

Fig. 3: *Smoothed velocity field deduced from ω Cen radial velocity measurements: spatial isorotation curves drawn on a meridian plane containing the rotation axis of the cluster (under the hypothesis of an equator-on view of the cluster)*

Rotation

It is well known that the flattening of elliptical galaxies is not necessarily due only to rotation, the latter being generally too weak to explain the large observed ellipticities. An alternative to galaxian rotation seems to be an anisotropy of the velocity dispersion in triaxial ellipsoids or oblate spheroids. In the case of globular clusters, the problem looks different; we then observe the internal parts in which the relaxation time scale is relatively short. Thus, at least in the central parts where rotation is expected, velocity dispersion obtained through dynamical models of globular clusters appears nearly isotropic. Given the small mean ellipticities of these clusters, we may think that their flattening is due to rotation, the latter being generally weak and therefore detectable with difficulty. Even though the rotation of some globular clusters had already been detected (ω Cen by Harding, ROB, 1965; M13 by Gunn and Griffin [unpublished]; 47 Tuc by Mayor et al, 1984, *AA* **134,** 118), no detailed velocity field V(r, z) was determined (distance r to the rotation axis and z to the equatorial plane).

The main characteristics of the velocity fields for the two clusters studied can be summarized as follows:

(i) solid-body rotation in the nucleus

ω Cen : $\Omega_c = 4.6$ km s^{-1} $r_c^{-1} = 1.3 \cdot 10^{-6}$ y^{-1}

47 Tuc : $\Omega_c = 2.7$ km s^{-1} $r_c^{-1} = 4.9 \cdot 10^{-6}$ y^{-1}

(ii) the maximum velocity V_{max}

(iii) the position of this maximum as a function of the radius

ω Cen : $V_{max} = 7.4$ km s^{-1} at $r = 3.2\ r_c$

47 Tuc : $V_{max} = 4.6$ km s^{-1} at $r = 3.5\ r_c$