

Preface

IAU Symposium 215 on *Stellar Rotation* was held from Monday 11 to Friday 15 November 2002 at the Westin Hotel, Cancun, Mexico. It was attended by 131 scientists from 24 countries and was considered, according to the many messages received, as a most successful scientific and social event. This meeting was an opportunity to honour Prof. Jean-Paul Zahn, who has greatly contributed to our knowledge of the physics of stellar rotation.

One sentence of the discussions best summarizes the meeting: “*Rotation is not optional in stellar evolution*”. A number of highlights were presented during these five days. For example, it was recalled that gravity darkening should not be neglected in the derivation of the $v \sin i$ parameter, otherwise the estimates of rotation velocities saturate near 250 km s^{-1} . Interferometric observations now start providing new insights into stellar distortions by rotation. Comparisons of rotational velocities for stars with models at different evolutionary stages in clusters confirm the role of various mechanisms at different stages, such as disc locking, surface magnetic braking, internal coupling and perhaps the role of magnetic field in shaping the observed distributions of rotation velocities. Chemical abundances from spectroscopic studies provide quantitative estimates on the role of rotational mixing in different evolutionary stages. The angular velocity Ω , derived from helioseismology, is found to be constant in the inner radiative zone of the Sun, while it is still uncertain near the solar centre. For very low mass stars with types later than mid M-types the fraction of rapid rotators is rapidly rising with decreasing masses. In binaries the observations regarding the synchronisation of the axial and orbital rotation periods now compare rather well to binary models, where rotation also appears as a key problem.

The physics of the instabilities driving the transport of elements and angular momentum in rotating stars is being studied, which in the presence of magnetic fields may be important as well. Many evolutionary models with rotation are now existing for various masses and metallicities. We may also wonder whether rotation is an important feature for the properties of the first stellar generations. Rotation shapes the nebulae around massive stars and also appears to be essential for explaining the shape of planetary nebulae. Rotation in white dwarfs and pulsars puts constraints on processes in all previous stages. The origin of γ -ray bursts represents a major challenge in which rotation may play a leading role. The 2-D and 3-D models, several of which have been shown, are promised to a bright future. The contributions presented here are of three kinds: review paper (10 pages), contributed talk (6 pages) and poster presentation (2 pages). They are arranged, as much as possible, in a logical order.

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This meeting is dedicated to Jean-Paul Zahn, who has done so much for our knowledge of stellar rotation.