REPORTS ON ASTRONOMY 2002-2005
Proceedings IAU Symposium No. XXVIA, 2006
O. Engvold (ed.)

doi:10.1017/S1743921306004637

Division V: Variable Stars

PRESIDENT: Jørgen Christensen-Dalsgaard
ORGANIZING COMMITTEE: Conny Aerts (President, C27), Alvaro Giménez (President, C42), Edward F. Guinan (past President of Div. V), Luis A. Balona and Jorge Sahade

Division V, "Variable Stars", consists of Commission 27, also called "Variable Stars" and Commission 42, "Close Binaries". Thus the former deals with stars whose variations are intrinsic, whereas in the latter the variations are caused by the interactions between the components in the binary. It is evident that the definition of the Division is predominantly observational, and there may be cases where the assignment of an object to one of the two commissions might be in doubt (a recent somewhat related example was the first detection of an extra-solar planet, in 54 Pegasi, where intrinsic variability of the star in the form of high-order g modes was also initially suspected).

The study of stellar variability is wideranging. The interest in understanding the broad range of physical phenomena that cause the variations is evident. Also, variability often provides diagnostics of other properties of the stars; because of the ability to measure the frequencies of variations with very high accuracy the resulting information is often of exceptionally high diagnostic value for the understanding of stellar structure and evolution. Examples are data on eclipsing binaries which provide very precise measurements of stellar global properties such as mass and radius and constraints on the internal structure through apsidal motion, and frequencies of pulsating stars which are being applied through asteroseismology to obtain detailed information about stellar interiors. Also, studies of variability associated with stellar magnetic activity, in single or close binary stars, are fundamental for our attempts to understand such activity, including the activity of the Sun which is of potentially substantial practical impact.

As documented by the reports of the commissions, the field of stellar variability is highly dynamic and rapidly evolving. On the observational side large-scale surveys, often with other principal goals, are providing unique information on variations in huge numbers of stars, transforming the statistical study of stellar variability and uncovering numerous examples of previously rare types of variables. Also, improvements in observing techniques have allowed studies of stellar variations with unprecedented sensitivity, leading to the detection in several cases of solar-like oscillations in other stars and with a promise of much more to come. Further exciting results have resulted and will result from space-based photometric experiments. A striking development is the study of objects spanning both Commissions, such as eclipsing binaries with pulsating components or cataclysmic variables containing a pulsating white dwarf. On the theoretical side, techniques for interpreting observations of stellar oscillations, including details of amplitudes and phases as resulting from the effects of the stellar atmosphere, are being developed, and there is an improving understanding of the causes of stellar pulsations throughout the Hertzsprung-Russell diagram. Also, stellar modeling is improving with the inclusion of hydrodynamical effects, and with some expectation that these improvements can be tested with asteroseismic investigations. Modeling of close binary systems is evidently more complex than the modeling of single stars, but substantial progress is being made here also.