Solar and stellar magnetic fields

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Main content

Article Preview :

The study of stars was once the central topic of astrophysics. However, the advent of large telescopes with efficient detectors plus the ability to observe non-optical radiation have made the present time the golden age of extragalactic astrophysics. Now these same advances are being applied to stars, with the result that a renaissance of stellar research is under way and this field is one of the most rapidly growing in astrophysics.

The present volume is good indication of current research on the physics of stars, specifically on activity that is thought to be caused by magnetic fields generated within stars. The book is the proceedings of a symposium that was cosponsored by no fewer than six comissions of the International Astronomical Union. Such broad sponsorhip indicates the wide interest in the subject. The organizing committee of te symposium chose to limit oral presentations to 17 invited reviews, 36 papers selected from submitted abstracts, and five summaries. An additional 56 papers were presented as posters. The book follows this organization by including all of the oral presentations save one. Poster papers are listed by title and author only. The result is the first IAU symposium volume that includes only half of the contributions. One hopes this is not the start of the new trend. The value of the book would have been greatly enhanced if at least the abstracts of the other papers had been included. the papers that are included fairly represent the symposium as a whole with one major exception: only five papers on solar observations, of the some 29 such papers presented...

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Footer

Measuring Magnetic Fields. Magnetic forces change the direction of motion of moving charged particles like electrons. Because of this, electrons that orbit around a nucleus in one direction will have more energy than electrons that orbit about the nucleus in the opposite direction. This allows us to remotely measure the Sun's magnetic field by observing the difference in the energy of the light emitted as these electrons jump from orbit to orbit. With the proper instrumentation we can determine both the strength and the direction of the

magnetic field all across the surface of the Sun. Cl Stellar activity studies are used for information on the early Sun and its environment, and for estimating activity effects on the young solar nebula. Large scale active structures are diagnosed from their rotational modulation signature, and reconstructed in three dimensions, using topographic or Doppler imaging techniques. Young stars undergo violent flares associated with coronal mass ejections leading to mass loss rates that can affect the stellar environment and stellar evolution. Young stars show large coronal condensations, magnetically linked with the stellar surface, that can be desta... Southward magnetic fields in the sheath and the ejecta induced a geomagnetic storm with a Dst global minimum of ~-90 nT. View full-text. Download citation. Magnetic fields are at the base of star formation and stellar structure and evolution. When stars are born, magnetic fields brake the rotation during the collapse of the mollecular cloud. In the end of the life of a star, magnetic fields can play a key role in the form of the strong winds that lead to the last stages of stellar evolution. During the whole adult life of a star, magnetic fields are the origin of stellar activity. Our Sun has magnetic fields that give rise to such spectacular activity that impacts the climate on Earth. Solar magnetism. 1. Structure and evolution of Sunspot magnetic fields. 2. Structure and evolution of quiet Sun magnetic fields. 3. Structure and evolution of the magnetism of the chromosphere and of chromospheric strcutures (promiences, spicules Solar and stellar dynamos (SOLSTAR group). All activity phenomena in the Sun and stars originate from their magnetic fields, which arise due to a hydromagnetic dynamo that converts kinetic energy into magnetic form. Even the solar dynamo remains enigmatic due to the extreme complexity of phenomena related to it. Observations of other stars provide important constraints on the stellar dynamo mechanism(s). The work of the group aims at combining these observations with theory and models to gain better understanding of the solar dynamo. In our work, we combine state-of-the-art numerical simulatio A stellar magnetic field is a magnetic field generated by the motion of conductive plasma inside a star. This motion is created through convection, which is a form of energy transport involving the physical movement of material. A localized magnetic field exerts a force on the plasma, effectively increasing the pressure without a comparable gain in density. As a result, the magnetized region rises relative to the remainder of the plasma, until it reaches the star's photosphere. This creates starspots