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Abstract

Observational data, analytical models, and instrumentation used to study the sun and its evolution are detailed, and attention is given to techniques for converting solar energy to useful power on earth. The star ignited when the mutual gravitational attractions of dust and vapor in a primordial cloud in the Galaxy caused an in-rush of accelerating particles which eventually became dense enough to ignite. The heat grew until inward rushing matter was balanced by outward moving radiative forces. The planets formed from similar debris, and solar radiation is suggested to have triggered the chemical reactions giving rise to life on earth. Visual, spectroscopic, coronagraphic, and UV observations of the sun from the ground and from spacecraft, particularly Skylab, are described, together with features of the solar surface, magnetic field, sunspots, and coronal loops. Models for the processes that occur in the solar interior are explored, as are the causes of solar flares. Attention is given to solar cells, heliostat arrays, wind turbines, and water turbines as means to convert, either directly or indirectly, the earth-bound solar energy to electrical and thermal power. Finally, the life cycle of the sun, about 9 billion yr in duration, is summarized, noting the current status of midlife.

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