APR05-2005-000238

Abstract for an Invited Paper
for the APR05 Meeting of
the American Physical Society

Dark Energy and Type Ia Supernovae: Present and Future

MARK PHILLIPS, Las Campanas Observatory, Carnegie Observatories

Since the pioneering work of Baade and Zwicky in the 1930s, astronomers have been aware of the possibility of using Type Ia supernovae to probe the expansion of the universe. However, only in the last 15 years has this potential been fully realized. After briefly recounting the discovery and calibration of the peak luminosity vs. decline rate relation for Type Ia supernovae which has allowed distance measurements to host galaxies to be made with a precision of 10% or better, I review recent results from high-redshift observations which confirm that the universe is currently being accelerated by a mysterious dark energy which comprises approximately 70% of the present energy density of the universe. Current research is focussed on measuring the equation of state parameter 'w' of the dark energy to determine if it is consistent with a cosmological constant (w = -1). This effort is reviewed, along with the observational problems which must be overcome to achieve this objective. Finally, the potential of future ground- and space-based programs for probing the nature of the dark energy is discussed.