Quantum Mechanics_Space physics

Space physics, also known as **space plasma physics**, is the study of plasmas as they occur naturally in the universe. As such, it encompasses a far-ranging number of topics, such as heliophysics which includes the solar physics of thesun: the solar wind, planetary magnetospheres and ionospheres, auroras, cosmic rays, and synchrotron radiation. Space physics is a fundamental part of the study of space weather and has important implications not only to understanding the universe, but also to practical everyday life, including the operation ofcommunications and weather satellites. Space physics is unique from other fields of astrophysics which study similar phenomenon, in that space physics utilizes in situ measurements from high altitude rockets and spacecraft.[1]

History

Space physics can be traced back to the ancient Chinese, who discovered and recorded sun spots. The Chinese also discovered the principle of the compass, but did not understand how it worked. During the 16th century, in *De Magnete*,William Gilbert gave the first description of the Earth's magnetic field, showing that the Earth itself is a great magnet, which explained why a compass needle points north. Deviations of the compass needle magnetic declination were recorded on navigation charts, and a detailed study of the declination near London by watchmaker and Fellow of the Royal Society, George Graham resulted in the discovery of irregular magnetic fluctuations that we now call magnetic storms, so named by Alexander Von Humboldt. Gauss and William Weber made very careful measurements of Earth's magnetic field which showed systematic variations and random fluctuations. This suggested that the Earth was not an isolated body, but was influenced by external forces. A relationship between individual aurora and accompanying geomagnetic disturbances was noticed byAnders Celsius and Olof Peter Hiorter in 1747. In 1860, Elias Loomis (1811–1889) showed that the highest incidence of aurora is seen inside an oval of 20 – 25 degrees around the magnetic pole. In 1881, Hermann Fritz published a map of the "isochasms" or lines of constant magnetic field

In the late 1870s, Henri Becquerel offered the first physical explanation for the statistical correlations that had been recorded: sunspots must be a source of fast protons. They are guided to the poles by the Earth's magnetic field. In the early

twentieth century, these ideas led Kristian Birkeland to build a terella, or laboratory device which simulates the Earth's magnetic field in a vacuum chamber, and which uses a cathode ray tube to simulate the energetic particles which compose the solar wind. A theory began to be formulated about the interaction between the Earth's magnetic field and the solar wind.

Space physics did not begin in earnest, however, until the first in situ measurements in the early 1950s, when a team led by Van Allen launched the first rockets to a height around 110 km. In 1958, a Geiger counter on board the first US satellite, Explorer 1 detected the Earth's radiation belts, later named the Van Allen belts. The boundary between the Earth's magnetic field and interplanetary space was studied by Explorer 10. Future space craft would travel outside Earth orbit and study the composition and structure of the solar wind in much greater detail. These include WIND (spacecraft), (1994), Advanced Composition Explorer (ACE),Ulysses, the Interstellar Boundary Explorer (IBEX) in 2008, and Solar Probe+. Other spacecraft would study the sun, such as STEREO and Solar and Heliospheric Observatory (SOHO).

References

1. ^ "Space Physics Textbook". 2006-11-26. Retrieved 2008-12-31.[*dead link*]

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