tactical and radio imagers, spectrometers, and magnetographs. For these reasons, the HESP Science Study Group has included ground-based instruments and observations as an integral part of the baseline HESP mission. The nature of HESP’s needs for ground-based instrumentation is well understood as the result of continuing experience with collaborative use of ground-based instruments in coordination with long-duration balloons, SMM, and YOHKOH. Ground-based instruments relevant to HESP include magnetographs (both longitudinal/full disk and vector/active-region), optical and microwave high-resolution imagers and imaging spectographs, and coronagraphs. The key to a successful HESP mission is adequate ground-based support in three respects: (1) capability for observations with the appropriate spatial, spectral, and temporal resolution, and polarimetric accuracy, from the point of view of the HESP scientific requirements; (2) sufficiently extensive coordinated ground-based coverage so that complementary data for HESP-selected events is likely to be available throughout the mission; (3) adequate support and the mechanisms so that reduced ground-based data is conveniently available as an integral part of the HESP data base.

33.06

SOHO - An Observatory to Study the Solar Interior and the Solar Atmosphere
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The Solar and Heliospheric Observatory, SOHO, is a joint venture of ESA and NASA. The main objectives of SOHO are: a) the study and understanding of solar coronal phenomena; and b) the study of the solar structure and interior dynamics from its core to the photosphere. The primary goals of the coronal and solar wind studies are to understand the coronal heating mechanism and its expansion into the solar wind. These goals will be achieved both by remote sensing of the solar atmosphere with high resolution spectrometers and telescopes and by "in situ" measurement of the composition and energy of the resulting solar wind. The structure and interior dynamics will be studied by helio-seismological methods and the measurement of solar irradiance variations. The SOHO spacecraft will be three-axis stabilized and located in a halo orbit around the L1 Lagrangian point (approximately 1% of the distance from the Earth to the Sun). It is currently scheduled for launch in July 1995.

An Experiment Operations Facility (EOF), located at NASA’s Goddard Space Flight Center, will be used to coordinate and plan the scientific operations of the payload. Its main task will be to organize the real-time operation of the payload and control the solar imager and spectrometric instruments during the daily 6-hr ground contact interval. The EOF will also serve as a focus for collaborative SOHO research.

This paper presents an overview of the SOHO mission in terms of its overall scientific objectives and its complement of instruments. Three instruments designed to study the solar wind will also be discussed: SWAN-Lyman observations of the heliosphere, CELIAS-solar wind low energy processes, and ERIEX and COSTEP-solar wind high energy processes.

33.07

LASCO - Large Angle Spectrometric Coronagraph for SOHO

The LASCO instrument images the solar corona from 1.1 R\(_S\) to 30 R\(_S\), with three, overlapping, separate coronagraphs. A new Lyot-type mirror coronagraph will be equipped with a narrow band Fabry-Perot interferometer to scan emission and absorption coronal line profiles simultaneously in 166 image locations from 1.1 R\(_S\) to 3 R\(_S\). Two externally occulted coronagraphs cover the outer corona from 1.5 R\(_S\) to 30 R\(_S\). In the inner corona, spectrometric investigations will determine kinetic temperatures, turbulence and line of sight velocities. Electron column densities can be determined over the whole field of view. While all three telescopes can be used as polarimeters, the inner coronograph can determine magnetic field direction (from Fe XIV). Hopefully, the initial acceleration of the solar wind can be observed spectrometrically within the field of view of the inner coronograph. Coronal mass ejections, sun-grazing comets, other transients and large scale coronal patterns can be tracked as they pass through the field of view of each of the telescopes.

33.08

The Ultraviolet Coronagraph Spectrometer for SOHO (UVCS)
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The purpose of the Ultraviolet Coronagraph Spectrometer (UVCS) is to provide information about the behavior, in the extended corona, of the primary particles (protons and electrons) and several minor ions (O\(_{3+}\), Mg\(_{2+}\), Si\(_{14+}\), and Fe\(_{15+}\)). Spectroscopic diagnostic techniques will be used to determine random velocity distributions, densities, and bulk outflow velocities for these particles. The resulting empirical description of the extended corona can be used to address a broad range of scientific questions regarding the nature of the solar corona and the generation of the solar wind. The instrument consists of an externally and internally occulted telescope assembly and a spectrometer assembly. It has three channels whose purposes are the following: 1) UV spectroscopy and absolute radiometry in the 1130 to 1361 Å wavelength range with spectral resolution up to 9800 and spatial resolution elements of 7′′ or larger, 2) EUV spectroscopy and absolute radiometry in the 937 to 1217 Å (first order) and 400 to 655 Å (second order) wavelength range with spectral resolution up to 1200 and the same spatial resolution as the VUV channel, and 3) White light radiometry with a wavelength band pass of 4500 – 6000 Å and a single 14′′ spatial resolution element. MAMA detectors provide simultaneous ultraviolet observations of a 40′′ long strip (parallel to a limb tangent) of the corona. Mirror and instrument motions allow this instantaneous field-of-view to scan out to heliocentric heights of 10 R\(_S\) and onto the solar disk. This work is supported by NASA under contract NASS-31250 to the Smithsonian Astrophysical Observatory.

33.09

Helioseismology from SOHO
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Three experiments are presently being developed for flight on the SOHO mission. The combination will provide a significant extension in capabilities from ground based observations. The VIRGO (Variability of solar irradiance and Gravity Oscillations) and GOLF (Global Oscillations at Low Frequencies) experiments will provide increased sensitivity for the lowest frequency acoustic modes and should significantly lower the detection threshold for gravity mode oscillations below that obtainable from present ground-based efforts. GOLF and VIRGO will be able to observe modes from spherical harmonic degree l = 0 to l = 3 and to l = 10 respectively. The SOI-MDI (Solar Oscillations Investigation - Michelson Doppler Imager) will allow observations to k = 2.2 M\(_{\odot}\)\(^{-1}\) (l = 1500) in the full disk mode and k = 6.5 M\(_{\odot}\)\(^{-1}\) (equivalent degree l = 4500) in a high resolution mode. The combination of the 3 experiments will allow low frequency observations in velocity (both photospheric and chromospheric), total irradiance, broadband and narrow band irradiance, and limb shape. The intrinsic solar noise will be the limiting factor in sensitivity for both p-modes and g-modes. The three experiments will provide the capability to allow seismic probing of the solar interior from the center of the sun to depths of only a few km. The three projects involve the joint efforts of people from at least 15 countries including 43 investigators, more than 44 associated investigators, and the efforts of more than 100 on the technical teams.