Session 3: Gamma Room, 1030–1200

03.01.02 Variations in the Solar Constant. R. G. ROZEN, NASA/GSFC New Mexico Stn., & R. S. HARRINGTON, U.S.N.O., Washington, DC - During the first half of this century a large body of daily determinations of the solar constant was assembled by the Astrophysical Observatory of the Smithsonian Institution (APO). Although the mean value for the solar constant derived from this work agrees exceptionally well with modern results, it is not certain whether variations in the daily determinations reflect changes in the solar output or changes in atmospheric conditions. The advent of modern high speed electronic computers has allowed us to apply power spectrum analyses as well as several statistical tests to these data. Periodicities found in the APO data as well as the likely causes for the observed variations will be discussed.

03.02.03 The Extreme Ultraviolet Spectrum of Sunspots. R. W. NOYES, Ctr. for Astrophys., Harv. Coll. Obs., Smith. Ast. Obs. - The Harvard College Observatory spectrometer on ATM has recorded many spectra of the atmosphere over sunspot umbrae, in the spectral range 300–1300 Å. The spectra show very great enhancements of emission from resonance lines of ions with characteristic temperatures of formation between 1.5 x 10^5 K and 10^6 K—in particular, lines of N IV, N V, O IV, O V, O VI, Ne V, Ne VI, Ne VII, and Ne VIII. Intersystem lines of O V, Ne VI, and Ne VIII are well observed. Many predicted but previously unobserved lines, as well as unidentified lines presumably formed in that temperature range, are visible in the spectra. The observed intensities are used to derive a model of the chromosphere and corona over sunspots.

03.03.03 Determination of the Doppler Width of Solar Ha in the Chromosphere. S. Wyckoff, Mica Observatory, Tel-Aviv University and R. Steinitz, Solar Division, Goddard Space Flight Center - A new method is developed for determining the Doppler width of the solar chromospheric Ha absorption profile. The method applies to a line having its source and sink terms indirectly controlled by radiation fields external to the line-forming zone. Good agreement is found between the Doppler width derived for solar Ha and previous results.

03.04.03 The Multi-Dimensional Structure of the Photosphere and Low Chromosphere of the Sun. RICHARD C. ALTROCK, Sacramento Peak Observatory, AFCEC, & C. J. CANNON, Dept. of Applied Maths, U. of Sydney - Final results from a study of the observed line-center rms intensity fluctuations and spatially-averaged asymmetric line profiles of Mg I 1CD71 are presented. The analysis utilizes the solution to the two-dimensional transfer equation in LTE under the assumption of sinusoidal horizontal temperature and velocity fluctuations. Two classes of solutions for the rms intensity fluctuation emerge. The first is a thin slab of fluctuations located approximately at 500 km above r = 0. We find that if this slab is 100 km in depth the peak-to-peak temperature fluctuation required is ~700 °K. The second class of solutions is one in which the temperature fluctuations pervade the whole photosphere. Under these circumstances, the magnitude (but not the distribution with observing angle) of the intensity fluctuations can be explained with a peak-to-peak variation of ~20% (~80 to 120 °K). The asymmetry of the spatially-averaged line profile can be reproduced by the addition of flow velocities of one to two km s^-1 to the second class of solutions above. The sense of the flow is such that cold elements are rising and hot elements are falling. This is the correlation to be expected in the convectively-stable region where this line is formed. The observation of a residual asymmetry at the limb may require departures from LTE. The relationship between these results and other multi-dimensional analyses will be discussed.

03.05.03 Solar Chromospheric Radio Observation of a Coronal Hole. W. HENZE, Teledyne Brown Engineering, F. WEBER, Megatek Corp., M. BLEWEISS, Naval Electronics Lab. Center, & C. BAUGHEN, NASA-Marshall Space Flight Center - A coronal hole which was present on the sun during August 1973 and was observed by the Apollo Telescope Mount on Skylab has been detected on radio maps obtained at 2.0 centimeters and 8.6 millimeters by the La Posta Geophysical Observatory of the Naval Electronics Laboratory Center. The hole shows a decrease in the brightness temperature on the order of 50 to 100°K relative to the quiet chromosphere which at these wavelengths has a brightness temperature of 12000°K and 9000°K respectively. Implications for models of coronal holes will be discussed.

03.06.03 Flow Patterns in the Interplanetary Medium. M. L. WHITE, Wellesley - The extended solar corona is idealized as a thin disc of gas rotating in the plane of the solar equator. It is assumed that the total vorticity is conserved. Some solutions to the equation for the conservation of vorticity are to be found in a recent paper by the author (1972 Astrophys.