Interference of Solar Oscillations. R. J. REIF, Joint Institute for Laboratory Astrophysics; and STEVEN MUSMAN, Sacramento Peak Observatory, ARIZON. - We analyzed magnetograph observations of the solar velocity field. The observations scanned a 60° by 300° region near the center of the disk for two hours.

In examining power spectra of the velocities at various points we found several examples where the oscillation was both restricted to a narrow bend of frequencies and a small region of space. Beat phenomena often occurred when waves from these different regions interfered.

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Determination of a Solar Magnetograph Zero Level Using Interplanetary Magnetic Field Observations. F. H. SCHERBER, J. M. WILCOX, University of California – Berkeley; A. SEVERNY, Crimea Astrophysical Observatory; and D. S. COLBURN, NASA Ames Research Center. - Observations of the mean photospheric magnetic field made with the solar magnetograph at the Crimea Astrophysical Observatory have been compared with interplanetary magnetic field data observed by spacecraft near the earth to determine an average zero-level correction for the magnetograph. The spacecraft observations were assumed to be correct, and incremental zero level corrections were made to the magnetograph observations. The cross correlation between the two observations was computed as a function of the zero level correction. The correction for the solar magnetograph was found to be 0.1 ± 0.05 gauss.

Observed Heights of EUV Lines Formed in the Transition Zone and Corona. GEORGE W. SIMON, Sacramento Peak Observatory, and ROBERT W. NOYES, Harvard College Observatory. - The heights of formation of a number of EUV lines in active regions have been measured from ROSAT spectrophotograms. From a least squares fit of these data we find Lyα 1026, Lyβ ν 538, Ly y 792, and the Ly continuum at 2000 km above the white light limb, He I 584, He II 304, C II 1335, and C III 977 at 3000 km, N II 391 and O IV 71, at 4000 km; MgII 2797 at 5000 km; ArII 7175 at 10000 km; Mg x 11000 km; Si XI 147; Fe VII 147; and Fe XVI 161 at 15000 km. Measurement errors are typically 2000 km, and all the quoted figures are rounded to the nearest 1000 km.

Observations of the Solar Oscillatory Component at 3mm Wavelength. W. SIMON, State University of New York at Stony Brook, and F. I. SHULAKOVO, The Aerospace Corp. - We have observed the solar oscillatory component at 3mm wavelength by its modulation of the solar free-free emission. The observations were carried out separately at 3.3mm and 3.5mm with two different radio telescopes to rule out possible instrumental and atmospheric effects. The strongest spectral component is at 5.5 ± 0.5 cph. These observations indicate that it is possible by radio techniques, to extend observations of the solar oscillations to higher heights than those previously observed in photospheric and low chromospheric lines.

A New Theory for Type II Solar Radio Bursts. D. F. SMITH, High Alt. Obs. - The theory of Tatsiev (1966, Soviet Astr. AJ 9, 572) which involves a collisionless laminar magnetohydrodynamic shock wave is revised so that due to the inhomogeneity of this type of shock significant excitation of electron plasma oscillations cannot occur. This result is supported by laboratory experiments on collisionless shock waves throughout the world. A stable shock structure in which electron plasma oscillations are highly excited has never been observed. A theory involving a slightly oblique collisionless magnetohydrodynamic shock wave in which ion-acoustic turbulence is excited has been developed. This type of shock structure has been observed in the laboratory. Electrons accelerated by the ion-acoustic turbulence leave the shock and become unstable in regions ahead of and behind the shock. This leads to the production of electron plasma waves which are subsequently scattered and combine to produce radiation near the fundamental and second harmonic of the plasma frequency as shown by Smith (1970, Adv. In Radio Sc. 7, 147). The theory is compared with observations of type II bursts.

Photospheric Magnetic Field Rotation: Rigid and Differential. ANDREW S. TANNERBORN, JOHN M. WILCOX, and KENNETH H. SCHATZEN, Univ. of California – Berkeley, and ROBERT HOWARD, Hale Observatories. - The solar magnetic sector pattern discussed by Wilcox and Howard appears to rotate in a rigid system, i.e., the shearing effects of differential rotation do not dominate. Wilcox and Howard have also found that the large-scale photospheric magnetic field has properties of differential rotation. This duality has been examined using autocorrelation of the direction of the photospheric field observed during 1959-1967. It is found that the field structure at some latitudes can display both differential rotation and rigid rotation properties.

Lunar Occultation of Flare Associated X-Ray Emission on 7 March 1970. ROGER J. THOMAS and WERNER M. NUEPERT, NASA/DSTC. - OSO-5 passed through the moon's shadow on 7 March 1970 shortly after the maximum of an important solar flare. The occultation of the flare by the moon's limb combined with the 320 millisecond time resolution of Goddard's pointed X-ray instrument provided a spatial resolution of up to one-half arc-second on the sun. Preliminary analysis of the integrated 2-8A X-ray emission recorded with a gas ionization chamber indicates that the flare-associated X-ray source had a total diameter of 1.1 x 10^9 km and extended roughly 3 x 10^4 km above the chromosphere. However, the one-dimensional profiles of the X-ray source show such small structures as small as a few arc-seconds within the emitting region. Since the moon's limb rotated about 70° between occultation and de-occultation, the identification of these structures with chromospheric features can be made with some confidence and, in a few cases, the approximate two-dimensional sizes can be determined. In addition, two plage-associated X-ray sources were occulted. Both appear to be roughly the size of the underlying chromospheric plage and seem to be rather featureless structures.

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A New Kind of Interference Filter. ALAN M. TITIE, Harvard College Observatory. - For a number of years all dielectric multilayer interference filters have been made from stacks of evaporated dielectric layers. Recently we have been experimenting with such filters in which one layer of the stack is made of glass. The typical filter is similar to a standard deposited design, except that the glass layer is hundreds to thousands of half-waves thick, rather than several, as is usually the case for all deposited designs. Transmissions of glass-deposited filters are typically sixty to seventy percent. Half-widths as narrow as 0.5 Angstroms have been obtained. Filters have been made with clear apertures of two to three inches. In addition, spatial resolution of one arc second has been achieved through these filters.

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