

(September, 1986 - February, 1990) of cycle 22. Evidence for the 154-day periodicity, significant at the $< 1\%$ level, was found in both of these data sets for the cycle 21 interval from February, 1980 - September, 1983 in which the periodicity was first detected. Using the Scargle periodogram technique with the significance test of Horne and Baliunas, we find no evidence, as of yet, for a recurrence of the 154-day periodicity during the current 22nd solar cycle.

49.07

The 22-Year Solar Cycle, Differential Rotation, and the Five-Month Period - Is There a Connection?

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The suggestion is made that the reported five-month period in the flare rate is the beat period between the rotation rates of the two manifestations of the 22-year solar cycle present in each hemisphere at different latitudes. Observations of enhanced coronal activity, ephemeral magnetic regions, and torsional oscillation as a function of latitude suggest that a new manifestation of the solar cycle originates at the poles every 11 years and takes at least 18 years to migrate to the equator (Snodgrass 1988). Thus, at any one time, there are two of these zones manifesting the solar cycle at different latitudes in each hemisphere. The region of sunspot activity at latitudes below 40 degrees is the final, most obvious, phase of the cycle; the other zone is less obvious at latitudes above 40 degrees. Being at different latitudes, these two zones rotate with a different period: 27 - 28 days for the low latitude zone and 28 - 40 days for the high latitude zone. For the time between 1980 and 1984, when the 152 - 158 day period in flare rate was most evident, the torsional oscillation data suggest that the two zones moved from latitudes of 13 and 58 degrees in 1980 to 7 and 42 degrees in 1982 (Howard and LaBonte 1983). If we take the rotation rates at these latitudes from the observed differential rotation rates of sunspots, then the beat period between the rotation periods of the two zones is of the order of five months. We explore the possibility that this is anything other than a numerical coincidence by searching for any other evidence of a connection between the two zones.

Howard and LaBonte, 1983, IAU Symp. 102, 101.
Snodgrass, H. B. 1988, Physics Today, January, p. S-11.

49.08

Fourier Spectrum Analysis of the Solar Neutrino Capture Rate

H.J. Haubold (United Nations), E. Gerth (Zentralinstitut fuer Astrophysik Potsdam)

J.N. Bahcall's standard solar model has not been verified as far as it concerns observational facts of helioseismology and solar neutrinos, respectively. Oscillation data suggest unexpectedly high densities and low sound speed near the solar center. Neutrino data reveal that the solar neutrino output may vary in time.

Periodic variations in R. Davis' experimental data concerning the solar neutrino capture rate are derived, on the basis of a Fourier spectrum analysis. Variations in the Argon-37 production rate (in atoms per day) are obtained for a series of unevenly spaced observations in the period 1970-1989 (runs 18-104). The harmonic analysis of runs 18-104 has determined solar neutrino flux

variations with periods of 10.00, 4.76, 2.17, 1.59, 1.32, 0.54, 0.52, and 0.50 yr., thereby confirming earlier calculations performed for the sets of runs 18-69 (1983), 18-74 (1985), 18-80 (1987), and 18-89 (1989). The results also confirm those of K. Sakurai (1979) who showed that there is strong evidence that the observed solar neutrino flux has a tendency to vary with quasi-biennial periodicity.

The prediction of periodicities in the solar neutrino flux is testable by the generation of solar neutrino detectors available in the near future.

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Session 50: Cosmology and Early Universe

Oral Session, 10:00-11:30 am

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50.01

Preliminary Millimeter and Sub-Millimeter COBE Observations of the Milky Way Galaxy with a 7° Beam

E. L. Wright (UCLA), E. S. Cheng, E. Dwek, C. L. Bennett, N. W. Boggess, J. C. Mather, R. A. Shafer, M. G. Hauser, T. Kelsall, S. H. Moseley, Jr., R. F. Silverberg (GSFC) G. F. Smoot (UCB), R. E. Eplee, R. B. Isaacman (GSC), S. S. Meyer, R. Weiss (MIT), S. G. Gulkis, M. Janssen (JPL), P. M. Lubin (UCSB), T. L. Murdock (GRC), and D. T. Wilkinson (Princeton).

Data from the Far Infrared Absolute Spectrophotometer (FIRAS) on COBE have been used to make maps of part of the Milky Way in the millimeter and sub-millimeter spectral region. These maps will be compared to the all-sky maps produced by the Differential Microwave Radiometer (DMR) experiment on COBE.

The National Aeronautics and Space Administration/Goddard Space Flight Center (NASA/GSFC) is responsible for the design, development, and operation of the Cosmic Background Explorer (COBE), under the guidance of the COBE Science Working Group. GSFC is also responsible for the development of the analysis software and for the production of the mission data sets.

50.02

Results from the COBE DMR Instrument at "Six Months" After Launch

C. Bennett (NASA/GSFC), G. Smoot (UCB), A. Kogut (NRC/NASA), P. Jackson, L. Rokke, C. Backus, K. Galuk, Q. Huang, P. Keegstra (STX), J. Aymon, G. DeAmici, L. Tenorio (UCB), S. Gulkis, M. Janssen (JPL), and P. Lubin (UCSB)

The distribution of the cosmic microwave background (CMB) radiation is a probe of the large scale structure and evolution of the Universe.

The Differential Microwave Radiometers (DMR) aboard the Cosmic Background Explorer (COBE)* are mapping the CMB radiation at frequencies of 31.5, 53, and 90 GHz (wavelengths 9.6, 5.7, and 3.3 mm), with two independent receivers at each frequency. The frequencies were chosen so that local Galactic emission is minimized, and the resulting spectral information will be used to separate local Galactic emission from the CMB radiation.

The DMR measures the difference in intensity between two horns with a fixed 60° separation, and a 7° (FWHM) beam. The spin and orbital motions of the spacecraft cause the beams to sweep out large fractions of the sky daily. The DMRs have observed the entire sky in their first six months of operation.

"Six month" sky maps will be shown and interpretations will be presented.

*COBE is supported by the NASA Astrophysics Division and managed by the GSFC.