ABSTRACTS OF PAPERS FROM OTHER JOURNALS


New calculations of predicted solar-neutrino fluxes, using a recently-derived rate for the proton-proton reaction and an improved abundance ratio of heavy elements to hydrogen, are reported. Uncertainties in the predictions are analyzed. The Davis, Harmer and Hoffman experiment is shown to imply that the sun does not derive most of its radiated energy from the carbon-nitrogen cycle, that the heavy-element mass fraction in the sun is probably less than 2%, and that the primordial helium content was of the order of 22% by mass. The present experimental upper limit on the neutrino flux is not incompatible with the theory of stellar structure, but if it were to be reduced by an order of magnitude then serious doubt would be cast on current ideas.

JAY M. PASACHOFF


A search was made for neutrinos emitted in the interior of the sun with a detection system containing 390000 liters of liquid C$_2$Cl$_4$ located in the Homestake gold mine at Lead, South Dakota. Exposures of 48 and 110 days were made, and no deviations were detected from the background. An upper limit was assigned of 0.5 neutrinos captured from the sun per day. Comparison with the neutrino flux expected from the decay of B$^8$ implies that the carbon-nitrogen cycle provides less than 9% of the solar energy.

JAY M. PASACHOFF


Velocity and temperature fluctuations in the solar photosphere were studied on a 55-min time-sequence of high-resolution spectrograms. Fourier techniques were used to study three lines formed at heights ranging from the convective zone to the temperature minimum. The low-frequency, convective, component, present at all levels of the photosphere, contributed most of the power spectrum of the velocity fluctuations. It was mostly coherent with the granulation and in phase with it. The 300-sec oscillatory component was resolved into a very sharp component with a 265 sec period and a weaker, broader component with a 345 sec period. Each period remained constant with altitude, but the former was relatively stronger at greater heights. No vertical phase lags were observed. The oscillations are probably steady-state standing waves.

Both convective and oscillatory components were present in the power spectra of the intensity fluctuations at all levels, the former dominating. Objections to both the gravity wave and acoustic wave explanations of the oscillations are raised.

JAY M. PASACHOFF


Lindholm red shifts have been computed, based on the Müller-Mutschlechner atmosphere model, for 20 Fraunhofer lines in the spectral range 6279–6325 Å.

The Lindholm red shift in the interval 0.1 ≤ τ ≤ 0.5 has been found not to exceed 0.0003 Å.

This implies that the observed red shift value of solar lines is not subject to Lindholm effect.

G. Y. VASSILYEVA


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The energy emitted by the center of the solar disk has been measured in the wavelength range 4477–8638 Å. The solar radiation has been compared to a black body kept in vacuum at 2600 K.

The results have been corrected for polarization, absorption lines and instrumental and atmospheric absorption.

The internal accuracy seems to be about 3%. The results are in agreement with Sitnik's, but differ by as much as 20% from Labs and Neckel's.

J.-C. Henoux


This posthumous paper reanalyzes continuum limb-darkening observations. It invokes a source function, of the form $2h^2/\pi^2 (\exp(hv/kT) - 1)^{-1}$ suggested by Kothari and Singh in 1941, to explain the discrepancy between theoretical and empirical absorption coefficients. The parameter $A$ is evaluated and the parameter $T$ is distinguished from the kinetic temperature for one of the cases under consideration.

This source function is considered to have a more fundamental meaning than that of a mere fitting function, which implies that "serious revisions are required in the current theory of radiative processes".

Jay M. Pasachoff


During an interval of one year near the minimum of the 11-year sunspot cycle, an interpolated pattern of the interplanetary magnetic field has been compared with the photospheric magnetic field. This reveals a persistent pattern in the solar field extending over a wide range of heliographic latitude on both sides of the equator. (Authors' abstract.)

Jay M. Pasachoff


The absolute flux of soft X-rays (2–12 Å) from a sequence of three solar flares on May 23, 1967, is
given as a function of time with a resolution of 163.6 sec. Maximum flux $F(2-12 \, \text{Å}) = 0.65 \, \text{erg cm}^{-2} \, \text{sec}^{-1}$ occurred at 1846 UT. This is believed to be the most intense solar X-ray flux that has been observed. (Author’s abstract.)

JAY M. PASACHOFF


The characteristics of 42 important flares (1956–1963) accompanied by type IV radio bursts and their connection with filaments were investigated. Many cases of spatial coincidences of flares and quiescent filaments were observed, both in active regions and away from them (anomal flares). In all 42 cases the flares propagated along existing, recently disappeared or newly appeared filaments. The character of the flare development, the forms of light curves, and the dimensions of filaments connected with flares were found to depend on the primary frequency of the flare radio emission. On the basis of the data from Ann. Obs. Meudon, 2, fasc. 1–3; 3, fasc. 1; 4, fasc. 1–3 the author obtained a relation between the filament dimensions and heights, which are at the same time the heights of the flares, connected with these filaments. The results of this work are given in the table.

<table>
<thead>
<tr>
<th>Characteristics of the flares</th>
<th>Primary frequency of radio emission</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9400–2000 MHz ($\lambda = 3–15 , \text{cm}$)</td>
</tr>
<tr>
<td>Number and % of flares</td>
<td>17 (40%)</td>
</tr>
<tr>
<td>Flare duration</td>
<td>139m</td>
</tr>
<tr>
<td>Time of rise to maximum</td>
<td>19m</td>
</tr>
<tr>
<td>Width of Hx</td>
<td>10.2 Å</td>
</tr>
<tr>
<td>Filament length</td>
<td>15° 2</td>
</tr>
<tr>
<td>Flare and filament heights</td>
<td>$17 \cdot 10^9 , \text{km}$</td>
</tr>
</tbody>
</table>


N. Stepanyan


Identifications are made or suggested for many ions, including Fe VIII–XVI and Ni X–XI, in the soft X-ray solar spectrum. A photograph is included showing spectra taken of the active and of the quiet sun. Element abundances relative to silicon are derived by the method of Pottasch. The iron-to-silicon ratio is probably between one and two, in agreement with work of Jordan and of Pottasch. The general coronal temperature is found to be $1.7 \times 10^6 \, \text{K}$, but isothermal models cannot explain all the lines in the spectral range under study.

JAY M. PASACHOFF


Simultaneous observations of faint microwave bursts at 3.2 cm wavelength with two radio telescopes (diameters are 4.7 and 2.5 m) located 500 m apart have been undertaken.
The method used permits one to reliably derive faint changes of the total solar flux of the order of 5–0.5%. The distribution of bursts obtained during 450 hours of observations is shown.

G. Y. Vassilyeva


Absolute experimental gf-values are reported for lines of FeI, CrI and CrII in the spectral region 3150–3780 Å. The results show disagreements with measurements of Corliss and others. Possible causes are discussed, and it is suggested that the absolute scale of the earlier measurements in the near-ultraviolet be lowered considerably. (From the Authors' abstract.)

JAY M. PASACHOFF