instrumentation (about 40 to 7000 Hz) the N , S , and I pulses (Baart, E. E., Barrow, C. H., and Lee, R. T., *Nature* **211**, 808, 1966) show some characteristic differences in the fine structure. The very short I pulses appear to fall into three classes: random and quasi-periodic groups, and individual single pulses. Some typical cases are presented.

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Continuous Opacity Due to the Metals in the Stellar Atmospheres. LARRY D. TRAVIS AND SATOSHI MATSUSHIMA, *University of Iowa* (present address: the Pennsylvania State University).—The bound-free absorption coefficients are determined for many neutral and once ionized metals, using the quantum defect method developed by Burgess and Seaton (*Monthly Notices Roy. Astron. Soc.*, **120**, 121, 1960). Only for these configurations where j - j coupling prevails is the hydrogenic approximation applied. For each atom, the individual computations are carried out for the transitions from many energy states, so that the atomic absorption coefficient as a function of wavelength may be obtained up to $\lambda 8000 \text{ \AA}$ with reasonable accuracy. Thus, the total mass absorption coefficient of each wavelength is determined for the ranges of T from 3878° to $10\,080^\circ\text{K}$ and $\log P_e$ from -2.0 to 3.5 , adopting the Goldberg-Mueller-Aller abundances. It is found that the elements making significant contributions at least in certain regions of the spectrum are C, Na, Mg, Al, Si, Ca, Cr, Fe, and Ni. Comparisons with experimental values show that the values obtained from the quantum defect method are accurate to within a factor of 2 or 3, and appear to differ by as much as a factor of 10 from the previous values computed by Vitense. The mass absorption coefficients due to the metals are also compared to the other known sources of opacity in the temperature and pressure ranges under consideration. It is found that the metal opacity becomes significant in the visual region of the spectrum if the hydrogen to metal ratio is reduced by factors of 10 to 10^4 and the remaining mass is assumed to be helium.

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Soft X-Ray ($\lambda < 14 \text{ \AA}$) Emission by the Sun Since 1 July 1966. J. A. VAN ALLEN, *University of Iowa*.—By means of three thin mica-window Geiger-Mueller tubes on the earth satellite Explorer 33, a nearly continuous patrol of the soft x-ray emis-

sion by the sun has been maintained with 1-min time resolution for the following periods:

1 July 1966–22 September 1966
9 October 1966–8 December 1966
27 December 1966–18 March 1967

and is continuing at the date of writing. Typical sensitivity is $10^{-6} \text{ erg (cm}^2 \text{ sec)}^{-1}$ and the dynamic range of intensity is 10^4 . A catalogue of x-ray flare events and detailed intensity-time profiles of selected events are presented. Four noteworthy events which are precursors of the arrival of solar-emitted particles are as follows:

Date	Time of onset	Time of max. intensity	Ratio of maximum intensity to that of ambient quiet sun
7 July 1966	00:23 UT	00:42 UT	28
28 August	15:22	15:31	70
2 September	05:46	05:58	60
13 February 1967	17:55	18:24	12

Some preliminary absolute intensities ($\lambda < 14 \text{ \AA}$) are (a) Mean quiet sun (September 1966): $4 \times 10^{-4} \text{ erg (cm}^2 \text{ sec)}^{-1}$. (b) Maximum intensity of 28 August 1966 event: $3 \times 10^{-2} \text{ erg (cm}^2 \text{ sec)}^{-1}$. (c) Time-integrated emission of 28 August 1966 event (assuming $2\pi \text{ sr}$ at the sun): $0.7 \times 10^{29} \text{ ergs}$. The x-ray flare events are intimately related to the $H\alpha$ flare reports and to terrestrial SID's (sudden ionospheric disturbances).

Parallax and Mass Ratio of the Visual Binary Σ 2398. PETER VAN DE KAMP AND NAHIDE GÜN GÖKKAYA, *Sproul Observatory*.—The 782 Sproul parallax plates of the double star Ci 2456 = Σ 2398 (1900: R. A. 18^h41^m7 , Dec. $+59^\circ29'$), taken over the interval 1913–1966, yield a relative parallax of $+".280 \pm ".003$ (p.e.).

The relative positions of the components are well represented by an orbit with a period of 355 yr, eccentricity 0.62, periastron passage 1790 and a semi-axis major $13".31$.

For the adopted value of absolute parallax $".284 \pm ".003$, the sum of the masses is found to be 0.82 sun's masses.

Least-squares solutions for mass ratio yield essentially equal masses for the two components, while small systematic deviations indicate a perturbation in the x coordinate of the A component.

Moving Pairs among the A-Type Stars within 20 pc. PETER O. VANDERVOORT, *University of*