atmosphere at STP. D the distance to Uranus and R_p the radius of Uranus.

The 'central flash', observed during the occultation of ϵ Gem by Mars¹⁶, and used to determine the extinction of the martian atmosphere⁹, will probably not be observable, since the centre of the Uranus shadow is predicted to be off the edge of the Earth.

Observers of this occultation should record their data digitally. The shortest timescale of importance for the 'spikes' will be $\sim \delta D/2v_1 \approx 0.3$ s, where $\delta = 5.8 \times 10^{-4}$ arc s (ref. 2) is the angular diameter of SAO158687. Higher time resolution data recording would be desirable, but is not essential.

We plan to observe this occultation from Perth and over the Indian Ocean with the 91-cm airborne telescope¹⁶. Observers of this occultation interested in coordinating the analysis of their results should write to one of us. We acknowledge the support of grants from NASA.

Note added in proof: An updated prediction for this occultation can be found elsewhere¹⁷.

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Predicted and observed coronal structure

THE total eclipse of the Sun of October 23, 1976 was observed in excellent conditions from Victoria (Australia). The observation programme was designed to study the shape and structure of the corona: this structure is caused by magnetic fields. The corona's shape generally undergoes changes that follow the 11-yr cycle of solar activity. At the time of the eclipse the Sun's activity was near its minimum. In July the mean sunspot relative number was 2.1, in August 16.9, in September 13.4, in October 21.8, and in November 5.5. In these months the activity of the old cycle was still stronger than that of the new one, except in October. The high number of that month was produced mainly by the new cycle. It is not yet certain whether the minimum had been reached by the time of the eclipse. In any case, solar activity was low, but stronger than during most of the earlier minima. Therefore a typical 'minimum-corona' was to be expected, but not the shape of the 'undisturbed corona'. This shape is seldom observed, and was last seen on June 30, 1954, when the Sun was almost completely free of spots for three months before the eclipse¹.

The corona of October 23, 1976, consisted of two main parts completely different in character: a belt of large streamers, going up to heliographic latitudes of $b=60^\circ$, and the polar regions. As well as some weaker features, there were four large, broad and bright streamers, one in each of the four quadrants. Prominences were found at the

base of these streamers, at $b=+41^\circ$ and -35° on the E-limb and at $b=-43^\circ$ on the W-limb. The least developed of the four main streamers was that of the NW-quadrant, in which no prominence was observed. The axes of the streamers deviated strongly from the radial direction and were more or less parallel to the Sun's equator. On the poleside the streamers had a sharp edge. The heliographic latitude of that edge, measured at the Sun's limb, was $+64^\circ$ in the NE-quadrant, -55° in the SE-quadrant, -60° in the SW-quadrant and $+46^\circ$ in the NW-quadrant.

The polar regions were less bright than the main streamers. Each of the two polar cups contained a bundle of about 20 short and narrow streamers, the so-called polar plumes. Around the solar axis their direction was radial, becoming more and more inclined as the polar distance increases.

As the shape of the streamers is formed by the magnetic fields, K. H. Schatten attempted to predict the structure of the corona using the photospheric magnetic fields measured at the Hale Observatories (Mt Wilson) between September 13 and October 10. The result, a computer-drawn plot made on October 18 (ref. 2), is compared with the observations in Fig. 1, which is a sketch of the corona's structure based on photographs obtained at the eclipse. Generally the agreement between observed and predicted patterns is satisfactory. One huge equatorial streamer was

Fig. 1 The structure of the corona at the solar eclipse of October 23, 1976. Observations are represented by solid lines and predictions by dashed lines.

predicted for both the east and the west limbs of the Sun, as could be expected for an 'undisturbed' corona. In fact, there were two streamers on each limb, one in each hemisphere, representing the 'minimum-type' rather than the 'undisturbed' corona. The dipolar field represents the polar plumes well. The positions at which the edges of the long streamers limit the polar regions were correctly predicted for the NE- and SW-quadrants. In the SE- and SW-quadrants, however, the observed heliographic latitude of the edges was about 20° smaller than the prediction.

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