

# Accurate Measurements of the Brightness of the White-Light Corona at the Total Solar Eclipses on 1 August 2008 and 22 July 2009

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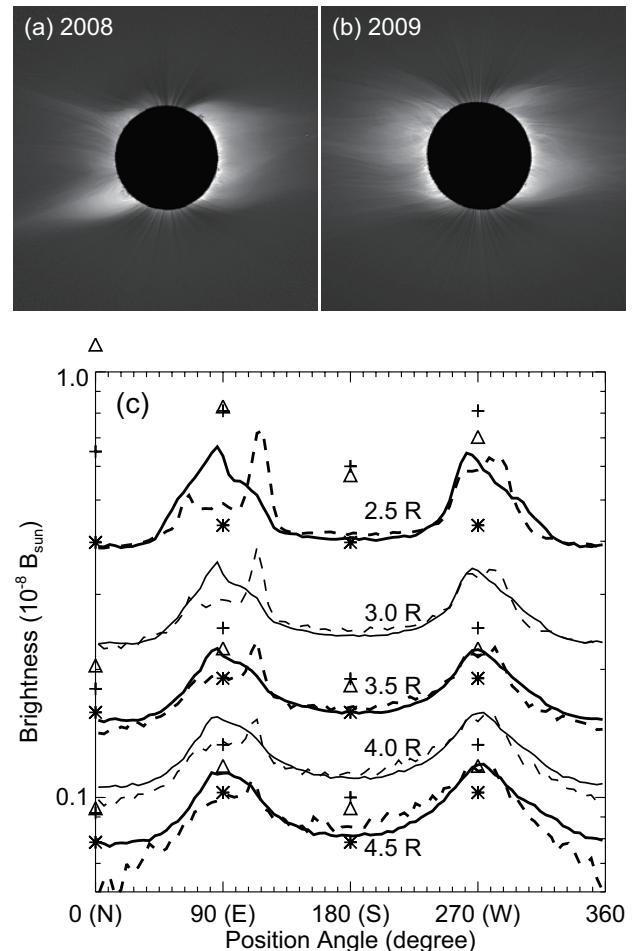
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The total eclipses are good chances to observe the white-light corona from just above the solar limb to as far as several solar radii. We measured the brightness of the white light corona at the total solar eclipses on 1 August 2008 and 22 July 2009 during the deep solar minimum, when solar activity was at its lowest in one hundred years [1]. After careful calibration, the total brightness of the corona in both eclipses was evaluated to be approximately  $0.4 \times 10^{-6}$  of the total brightness of the Sun. The measured value is lower than those measured in the former minima [2]. The total brightness of the white-light corona corresponds to the total amount of the coronal material. Therefore, the low brightness of the corona shows that the amount of the coronal material was particularly small when the magnetic activity on the solar surface became quite low.

Furthermore, we compared the total brightness of the K + F-corona beyond  $3 R_{\odot}$  in both eclipses to the formerly measured brightness of the F-corona only (Figure 1). The measured results of the F-corona show some scatter, because it is generally difficult to isolate the F-corona from the K+F-corona. Our results show that the K + F-corona brightness values at the two eclipses are lower than some of the F-corona only brightness values previously measured. Due to the low solar activity, the K-corona brightness beyond  $3 R_{\odot}$  is quite low at the two eclipses, and our measurements give the reliable upper limit of the F-corona brightness on the basis of the high-accuracy calibration.

## References

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**Figure 1:** (a) Stacked images of the white-light corona taken in the 1 August 2008 eclipse and (b) the 22 July 2009 eclipse. To show the fine structures in the corona clearly, radial brightness decrease is suppressed, and structures of the coronal streamers are enhanced. The solar north is to the top. (c) Tangential coronal brightness distributions in the 2008 (dashed curves) and the 2009 (solid curves) eclipses at radii of 2.5, 3.0, 3.5, 4.0, and 4.5  $R_{\odot}$ . Formerly measured brightness values of the F-corona [3,4,5] for radii 2.5, 3.5, and 4.5  $R_{\odot}$  are also shown by triangles, plus signs, and stars. Our results for these radii are shown in thick curves.