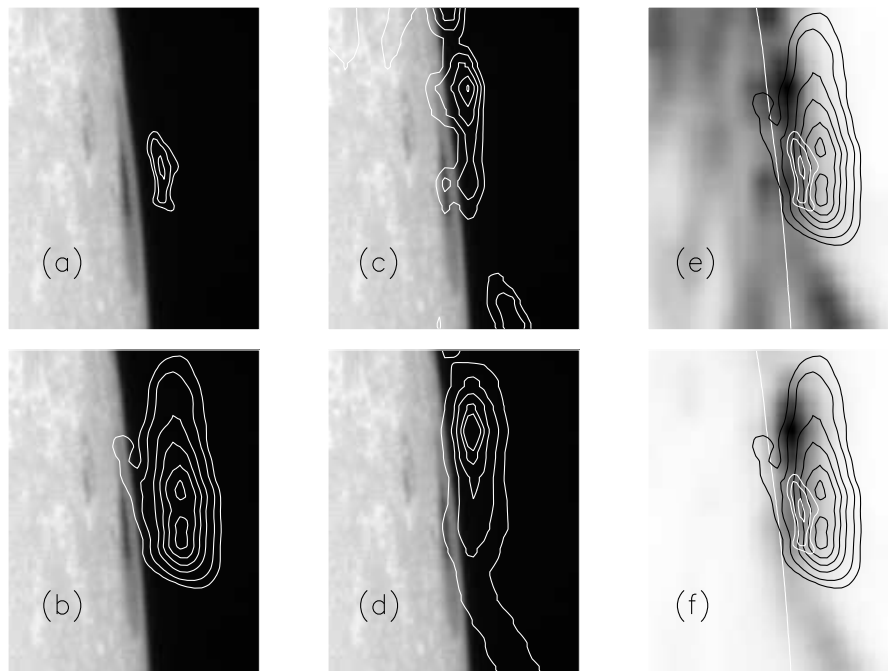


Strong Coronal Magnetic Fields Measured Above Sunspots



We measure coronal magnetic field strengths of 1750 G at a height of 8000 km above a large sunspot in AR 10652 at the west solar limb on 2004 July 29 using coordinated observations with the Very Large Array, *TRACE*, and three instruments (CDS, EIT, MDI) aboard *SOHO*. This observation is the first time that coronal radio brightness temperatures have been analyzed in a 15 GHz solar radio source projected above the limb. Observations at 8 GHz yield coronal magnetic field strengths of 960 G at a height of 12,000 km. Field strengths are derived from the fact that the radio sources are produced by 3rd harmonic gyroemission. The field strength measurements combine to yield a magnetic scale height $L_B = 6900$ km. The radio brightness temperature maxima are located away from a sunspot plume that appears bright in EUV line emission formed at temperatures around several 10^5 K. Coaligned white light, EUV, and radio observations are shown in the above figure. Frames (a) - (d) show white light images with (a) 15 GHz radio intensity contours; (b) 8 GHz radio intensity contours; (c) O^{+4} (O V, formed at 2.5×10^5 K) 629.7 Å intensity contours; (d) Ne^{+5} (Ne VI, 4.0×10^5 K) 562.8 Å intensity contours. Frame (e) shows the negative intensity image of O V at 629.7 Å and frame (f) shows the negative intensity image of Ne VI at 562.8 Å, with the same 15 and 8 GHz radio intensity contours displayed in (a) and (b). The limb is drawn as a white contour in (e) and (f). Solar north is up and west is to the right in this $70'' \times 90''$ field of view. [From J. W. Brosius & S. M. White, *The Astrophysical Journal (Letters)*, vol. 641, p. L69 (2006 April 10).]