

4. PIONEER 11 ABSOLUTE CALIBRATION

The effective wavelength (λ_{eff}) is defined as the average over wavelength weighted by the channel spectral transmission, $T(\lambda)$. The equivalent band-pass ($\Delta\lambda$) is defined by $\Delta\lambda T_{max} = \int T(\lambda) d\lambda$. THE BRIGHTNESSES LISTED IN THE BST (BPc, RPc, BSc, RSc) ARE IN EDR OR RELATIVE UNITS. TO CONVERT THEM TO $S_{10}(V)$'s - the equivalent number of 10th visual magnitude stars of solar color per square degree - THEY MUST BE MULTIPLIED BY THE CALIBRATION CONSTANTS (C) GIVEN BELOW:

Channel	λ_{eff}	$\Delta\lambda$	C
BP	4445A	844A	0.674
RP	6508A	889A	0.810
BS	4388A	790A	0.624
RS	6453A	978A	0.903

The total blue (red) brightness in $S_{10}(V)$ units is the sum of the sum of the two blue (red) channels:

TOTAL BLUE BRIGHTNESS IN $S_{10}(V)$ UNITS = 0.674BPc + 0.624 BSc,

TOTAL RED BRIGHTNESS IN $S_{10}(V)$ UNITS = 0.810 RPc + 0.903 RSc.

The $S_{10}(V)$ unit contains the solar spectral distribution; i.e., a source of solar color has the same $S_{10}(V)$ value at all wavelengths. The conversion to absolute units therefore depends on the effective wavelength of each Pioneer channel. The conversion of $S_{10}(V)$ units to absolute units for each channel of Pioneer 11 is listed below:

Channel	Conversion
Bp	1 $S_{10}(V) = 1.20 \times 10^{-9}$ ergs $cm^{-2} s^{-1} sr^{-1} A^{-1}$
Rp	1 $S_{10}(V) = 1.06 \times 10^{-9}$ ergs $cm^{-2} s^{-1} sr^{-1} A^{-1}$
Bs	1 $S_{10}(V) = 1.18 \times 10^{-9}$ ergs $cm^{-2} s^{-1} sr^{-1} A^{-1}$
Rs	1 $S_{10}(V) = 1.07 \times 10^{-9}$ ergs $cm^{-2} s^{-1} sr^{-1} A^{-1}$