ISOCAM PHOTOMETRIC SYSTEM

Contribution to the CAM Calibration Wksh, Orsay, 3-5/2/99 by Joris Blommaert, IDC

ISOCAM follows the convention adopted for IRAS.

Important parameters ("*in capitals*") are given in the CCG*WSPEC file.

"SENSITIV" converts the observed ADU/G/s into a monochromatic flux density F_ν ([Jy]) at a certain reference wavelength ("WAVELENG") assuming an input energy distribution: $F_\nu \sim \nu^{-1}$ or $F_\lambda \sim \lambda^{-1}$.

If the observed source has a different Spectral Energy Distribution then,

$$F_{actual}(\lambda_{ref}) = F_{derived}(\lambda_{ref})/K(\lambda_{ref})$$

where F_{actual} is the actual flux density of the source and $F_{derived}$ is the one obtained by dividing the measured signal by the SENSITIV parameter. $K(\lambda_{ref})$ is given by:

$$K(\lambda_{ref}) = \left(\int F(\lambda)/F(\lambda_{ref}) \times \lambda/\lambda_{ref} \times R(\lambda)d\lambda\right) / \left(\int R(\lambda)d\lambda\right)$$

$$R(\lambda) \sim FilterTransmission(\lambda) \times QuantumEfficiency(\lambda)$$

$R(\lambda)$ for each filter is given by "TRANS" as function of "WAVE" (and are shown in the ISOCAM manual: Figs 9 and 10).

Note that there is a λ-factor difference with often used colour correction factors. This is because $R(\lambda)$ is related to the detector quantum efficiency times filter transmission (measured in A / (incoming photon / sec)) and not as a detector response (A/Watt) which is often used (e.g. ISOPHT).

The new reference wavelengths are "easy to remember" wavelengths and give a better comparison with PHT and IRAS filters.

References:

ISOCAM Photometry Report, J. Blommaert, 1998
Reference Wavelengths for ISO: CAM and PHT filters: Moneti etal, 1997

Table 1: LW sensitiv values, reference wavelengths, colour corr. for A0V star

Filter	N	λ μm	Mean Adu/G/sec/mJy	RMS	col. corr.
LW1	12	4.5	0.77	0.04	1.02
LW2	5	6.7	2.32	0.08	1.08
LW3	7	14.3	1.96	0.09	1.03
LW4	8	6.0	0.78	0.06	1.02
LW5	6	6.8	0.35	0.03	1.01
LW6	11	7.7	1.03	0.07	1.00
LW7	6	9.6	1.33	0.09	1.01
LW8	6	11.3	0.78	0.04	1.00
LW9	10	14.9	0.65	0.02	1.01
LW10	8	12.0	4.23	0.23	1.29

Table 2: idem SW

Filter	N	λ μm	Mean Adu/G/sec/mJy	RMS (%)	col. corr.
SW1	8	3.6	0.41	4.6	1.05
SW2	6	3.3	0.12	4.9	1.04
SW3	6	4.5	0.26	3.4	1.06
SW4	6	2.8	0.30	2.9	1.02
SW5	8	4.0	0.77	4.8	1.04
SW6	5	3.7	0.19	6.0	1.01
SW7	4	3.0	0.16	4.5	0.96
SW8	6	4.05	0.038	7.2	1.02
SW9	5	3.9	0.074	5.8	1.03
SW10	5	4.6	0.092	2.5	0.98
SW11	5	4.26	0.058	5.5	1.02

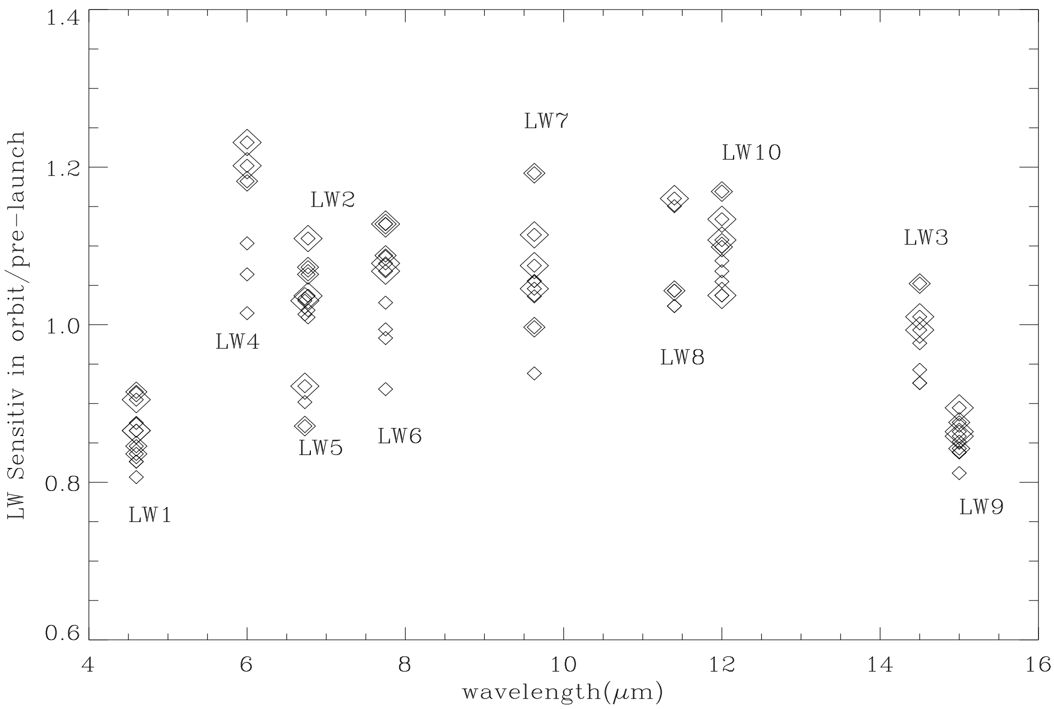

Figure 1: The in-orbit LW SENSITIV values compared to the pre-launch values. 1.5, 3 and 6″ PFOV measurements are included. The smallest symbols are 1.5″ and the largest are 6″ measurements.