Need for faint source ISOCAM public datasets
V1.0 - January 1999 - FXD

or

Are we on the same flux scales?

There are now several teams working on extracting sources from ISOCAM images at the limit of what ISOCAM can do. Although an accurate photometry of the found objects may not be the major preoccupation of our minds at that point (after all 20 % photometry is fine for 3-5 sigma detections), we need to be sure that we do not make factor 2 errors at the end of the day, on the sources which are visible only after coadding many readouts (can be up to several hours per sky pixel). Hence, it would be nice to say that each software that is in the air has been tested against well known sources for which the flux is previously known. Using calibration stars is very far off in flux scale from the sources we are dealing with. So, may I suggest that some raw ISOCAM datasets be made public as a standard faint source calibration set? A minimum requirement would be :

LW2, LW3 rasters with 1 arcmin steps, at least 4 by 4 positions, with 2, 5, 10 second of integration time per readout, on weak stars (say below or at the mJy level) for which the flux can be inferred from ground-based measurements and stellar photospheric models.

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Photometric corrections for ISOCAM faint source fluxes.
V2.0 - January 1999 - FXD

The point source fluxes are measured with a Gaussian template fitting (for best S/N output) on ADUGS map (ADU/per gain/per second) as explained in Desert et al, 1999, A\&A, 342, 363. One cannot directly use the Cookbook value to convert to microJy.

There are photometric corrections to apply. We used throughout a Gaussian template of 9 arcsec FWHM.
In order to explain the 1.1 and 1.4 factor to go from Gaussian to Aperture photometry measurement (Ap),
I simulated an ISO PSF+ pixelisation of 6" and projection on 1.5" sampling.
Then I smooth twice by 3*3 kernel (as I do in the reduction process) and I add a gaussian projection error of sigma=3.5" (determined during the simulation). I find the correction factor to go from G or Ap to total real PSF value.

	6.7	12	15 um	HDF6.7	HDF15
g	1.35	1.52	1.63	1.83	1.87
Ap	1.10	1.16	1.18	1.08	1.17
g/Ap	1.22	1.31	1.38	1.69	1.60

so in fact, the aperture photometry is still a bit off (it was taken in a circle of 15 arcsec radius and baseline between 15 and 21 arcseconds).

The calibration is for Orsay method from ADUGs to Jy at nominal wavelength
the multiplicative factor

Gaussian_flux_measured*(Cookbook*eta_global)= Fc
i.e. Fnu(intermediate in uJy) as given in internal point source catalogs
eta_global is the camrera efficiency with respect to ground-based calibration (it was quoted as 0.8 by Cesarsky et al AA Special Issue but is now believed to be close to 1 once the transients in the PSF wings are taken into account).

For galaxies one then corrects by the g factor to get real uJy
Fnu(final)= g* Fc
This is what should be published.

For stars, the problem is that the spectrum is steep towards short wavelengths so the effective wavelength is shorter than for galaxies. So one must do 2 corrections:
Fnu(final)= g(at short wavelength)* CC* Fc

On the other hand, to put a stellar model on color - color plots involving isocam one must divide the model by CC and correct for the ratios of g. For example the 15 um band starts at 12 um so the g to apply for stars at LW3 is 1.52 instead of 1.63

Note that the raster steps for HDF was so small as to change the g factor
relative to large steps.

I hope this settles the question. The CC term is important in order to calibrate against stars but the g term too. We give our color correction table in the annex.

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; Version 3 - FXD - 5/1/1998
; Cookbook values for Jy are correct for an assumed incident
;   flat spectrum in NuFnu. In case of a known departure from this
; shape, one has to correct the ISOCAM value by a color correction.
; Correction applies to Jy as measured by isocam to get Jy at the
; nominal wavelength if the spectrum follows a power law.
; Inversely, one can convert a model prediction of Jy at the
; nominal wavelength to Jy as measured by dividing the prediction by
; the color correction
; i.e. CC here is 1/K (JBlommaert)
; For nominal wavelengths may I suggest to keep the old ones except
; for LW10 where we should be consistent with the 12 micron adopted
;  by IRAS?
 Isocam Wavelength (micron)
 4.500  6.750  15.00  6.000  6.750  7.750  9.630  11.40  15.00  11.50
 LW1    LW2    LW3    LW4    LW5    LW6    LW7    LW8    LW9    LW10
 Exponent Fnu= nu^(alpha)  Alpha=      -3.00000
 Correction factor old_to_new =
 0.983  0.929  1.045  0.987  0.983  0.985  0.976  1.002  0.996  0.928
 Exponent Fnu= nu^(alpha)  Alpha=      -2.50000
 Correction factor old_to_new =
 0.989  0.954  1.038  0.992  0.987  0.990  0.985  1.002  0.997  0.955
 Exponent Fnu= nu^(alpha)  Alpha=      -2.00000
 Correction factor old_to_new =
 0.994  0.974  1.028  0.995  0.992  0.994  0.991  1.002  0.999  0.976
 Exponent Fnu= nu^(alpha)  Alpha=      -1.50000
 Correction factor old_to_new =
 0.997  0.989  1.015  0.998  0.996  0.998  0.996  1.001  1.000  0.992
 Exponent Fnu= nu^(alpha)  Alpha=      -1.00000
 Correction factor old_to_new =
 1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000
 Exponent Fnu= nu^(alpha)  Alpha=     -0.500000
 Correction factor old_to_new =
 1.001  1.005  0.982  1.001  1.004  1.001  1.002  0.999  1.000  1.001
 Exponent Fnu= nu^(alpha)  Alpha=      0.000000
 Correction factor old_to_new =
 1.002  1.005  0.961  1.001  1.008  1.002  1.002  0.997  1.000  0.995
 Exponent Fnu= nu^(alpha)  Alpha=      0.500000
 Correction factor old_to_new =
 1.001  0.998  0.938  1.000  1.011  1.002  1.001  0.995  0.999  0.982
 Exponent Fnu= nu^(alpha)  Alpha=       1.00000
 Correction factor old_to_new =
 0.999  0.986  0.914  0.998  1.014  1.000  0.998  0.993  0.998  0.962
 Exponent Fnu= nu^(alpha)  Alpha=       1.50000
 Correction factor old_to_new =
 0.996  0.969  0.887  0.996  1.017  0.998  0.994  0.991  0.996  0.935
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 Exponent Fnu= nu^(alpha)  Alpha=       2.00000
 Correction factor old_to_new =
 0.992  0.946  0.858  0.992  1.020  0.994  0.987  0.988  0.995  0.902
 Exponent Fnu= nu^(alpha)  Alpha=       2.50000
 Correction factor old_to_new =
 0.986  0.918  0.829  0.987  1.023  0.990  0.980  0.985  0.992  0.864
 Exponent Fnu= nu^(alpha)  Alpha=       3.00000
 Correction factor old_to_new =
 0.980  0.886  0.798  0.982  1.025  0.985  0.971  0.981  0.990  0.822


; NEW COLOUR CORRECTION IF MONETI ET AL WAVELENGTHS ARE ADOPTED
LW1    LW2    LW3    LW4    LW5    LW6    LW7    LW8    LW9    LW10
 Isocam Wavelength (micron)
4.500   6.700   14.30   6.000   6.800   7.700   9.600   11.30   14.90 12.00
 Exponent Fnu= nu^(alpha)  Alpha=      -3.00000
 Correction factor old_to_new =
 0.983  0.915  0.949  0.987  0.997  0.972  0.970  0.984  0.982  1.011
 Exponent Fnu= nu^(alpha)  Alpha=      -2.50000
 Correction factor old_to_new =
 0.989  0.943  0.966  0.992  0.998  0.980  0.980  0.989  0.987  1.018
 Exponent Fnu= nu^(alpha)  Alpha=      -2.00000
 Correction factor old_to_new =
 0.994  0.967  0.980  0.995  0.999  0.988  0.988  0.993  0.992  1.019
 Exponent Fnu= nu^(alpha)  Alpha=      -1.50000
 Correction factor old_to_new =
 0.997  0.986  0.991  0.998  1.000  0.994  0.995  0.997  0.996  1.013
 Exponent Fnu= nu^(alpha)  Alpha=      -1.00000
 Correction factor old_to_new =
 1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000  1.000
 Exponent Fnu= nu^(alpha)  Alpha=     -0.500000
 Correction factor old_to_new =
 1.001  1.009  1.006  1.001  1.000  1.005  1.004  1.003  1.003  0.980
 Exponent Fnu= nu^(alpha)  Alpha=      0.000000
 Correction factor old_to_new =
 1.002  1.012  1.008  1.001  1.000  1.008  1.005  1.006  1.006  0.954
 Exponent Fnu= nu^(alpha)  Alpha=      0.500000
 Correction factor old_to_new =
 1.001  1.009  1.008  1.000  1.000  1.011  1.006  1.009  1.009  0.922
 Exponent Fnu= nu^(alpha)  Alpha=       1.00000
 Correction factor old_to_new =
 0.999  1.001  1.005  0.998  0.999  1.013  1.004  1.011  1.011  0.884
 Exponent Fnu= nu^(alpha)  Alpha=       1.50000
 Correction factor old_to_new =
 0.996  0.987  0.999  0.996  0.999  1.014  1.001  1.013  1.013  0.841
 Exponent Fnu= nu^(alpha)  Alpha=       2.00000
 Correction factor old_to_new =
 0.992  0.967  0.991  0.992  0.998  1.014  0.997  1.014  1.015  0.794
 Exponent Fnu= nu^(alpha)  Alpha=       2.50000
 Correction factor old_to_new =
 0.986  0.942  0.980  0.987  0.997  1.013  0.991  1.016  1.016  0.744
 Exponent Fnu= nu^(alpha)  Alpha=       3.00000
 Correction factor old_to_new =
 0.980  0.913  0.966  0.982  0.995  1.011  0.983  1.016  1.016  0.693
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