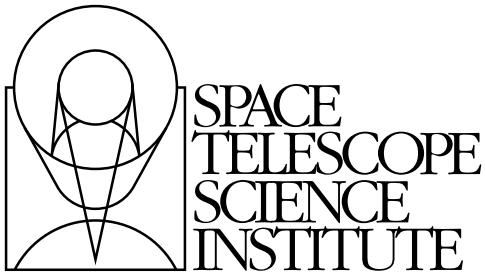

Technical Software Report 2011-4

TSR 2011-4: Comparison of Synphot and Pysynphot Bandpar Functionality

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November 15, 2011

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CHAPTER

ONE

COMPARISON OF SYNPHOT AND PYSYNPHOT BANDPAR FUNCTIONALITY

Abstract

Pysynphot attempts to replicate much of the functionality of the Synphot `bandpar` utility but sometimes uses different formulae and algorithms. This TSR collects the calculations used in Pysynphot, Synphot, and the formula described in the Synphot Manual on page 42.

CHAPTER

TWO

PHOTBW - BANDW - RMS WIDTH

2.1 Synphot

The Synphot Manual gives the equation for RMS bandwidth as

$$\lambda_{rms}^2 = \bar{\lambda}^2 \frac{\int P_\lambda \ln(\lambda/\bar{\lambda})^2 \, d\lambda/\lambda}{\int P_\lambda \, d\lambda/\lambda}$$

where

$$\bar{\lambda} = \exp\left[\frac{\int P_\lambda \ln(\lambda) \, d\lambda/\lambda}{\int P_\lambda \, d\lambda/\lambda}\right].$$

The Synphot function rmslam does appear to implement this procedure for calculating the RMS width of the bandpass. The source code references the WF/PC-1 Instrument Handbook as the source of the equation for RMS width and references Schneider, Gunn and Hoessel (1983 ApJ 264,337) as the source for the equation for mean wavelength.

A copy of the WF/PC-1 Instrument Handbook could not be found so it has not been verified that the Synphot code faithfully reproduces whatever may be documented there.

2.2 Pysynphot

The Pysynphot source code references Koornneef et al 1987, page 836 as the source for its RMS width calculation, which appears to be

$$\lambda_{rms}^2 = \frac{\int P_\lambda (\lambda - \bar{\lambda})^2 \, d\lambda}{\int P_\lambda \, d\lambda}$$

where

$$\bar{\lambda} = \frac{\int \lambda P_\lambda \, d\lambda}{\int P_\lambda \, d\lambda}.$$