PS1 Kron photometry of extended sources

Kron photometry is determined from the observed (smoothed) profile of each Detection. A Kron radius is determined for all objects, irrespective of whether they are point sources or not, and the magnitude is inferred from the growth curve (enclosed flux vs. radius).

Contents

The starting point for the PS1 data archive is at Pan-STARRS1 data archive home page.

Definition

Look up the formal definition (Kron 1980, ApJS 43, 305).

The Kron 1980 paper shows how to define a nominal magnitude for an extended object on the basis of the shape of the light profile. In the PanSTARRS implementation, the definition of the Kron radius and Kron magnitude is carried out as follows:

- Kron Radius determined from smoothed image
- start with isophotal aperture at sky level
- measure moments
- redefine aperture to be 6x 1st radial moment
- re-measure moments
- Kron flux is measured inside 2.5 * 1st radial moment
- 1.0 * 1st radial moment and 4.0 * 1st radial moment fluxes are also measured as KRON_INNER and KRON_OUTER

Be aware that by definition Kron magnitudes do NOT encompass the total flux from an object, and in DR1 no attempt is made to correct the Kron fluxes for this missing light. Some information on the size of this effect for galaxies can be seen in this article, but very roughly expect 10% of the flux to be missing.

Values Available

Kron parameters are listed in several different tables, depending on their origin (warp images, stack images, mean values, etc.) The **PS1 MeanObject table fields** table includes:

Name	Unit	Data Type	Size	Default Value	Description
gMeanKronMag	AB magnitudes	REAL	4	-999	Mean Kron (1980) magnitude from g filter detections.
gMeanKronMagErr	AB magnitudes	REAL	4	-999	Error in mean Kron (1980) magnitude from g filter detections.
gMeanKronMagStd	AB magnitudes	REAL	4	-999	Standard deviation of Kron (1980) magnitudes from g filter detections.
gMeanKronMagNpt	dimensionless	SMALLINT	2	-999	Number of measurements included in mean Kron (1980) magnitude from g filter detections.

and similar entries in the same row for *rizy* filters.

StackObjectThin contains:

Name	Unit	Data Type	Size	Default Value	Description
gKronMag	AB magnitudes	REAL	4	-999	Kron (1980) magnitude from g filter stack detection

gKronMagErr	AB magnitudes	REAL	4	-999	Error in Kron (1980) magnitude from g filter stack detection.

and similar entries in the same row for *rizy* filters.

StackObjectAttributes contains:

Name	Unit	Data Type	Size	Default Value	Description
gKronFlux	Janskys	REAL	4	-999	Kron (1980) flux from g filter stack detection.
gKronFluxErr	Janskys	REAL	4	-999	Error in Kron (1980) flux from g filter stack detection.
gKronRad	arcsec	REAL	4	-999	Kron (1980) radius from g filter stack detection.

and similar entries in the same row for *rizy* filters.

ForcedMeanObject contains:

Name	Unit	Data Type	Size	Default Value	Description
gFKronFlux	Janskys	REAL	4	-999	Mean Kron (1980) flux from forced single epoch g filter detections.
gFKronFluxErr	Janskys	REAL	4	-999	Error in mean Kron (1980) flux from forced single epoch g filter detections.
gFKronFluxStd	Janskys	REAL	4	-999	Standard deviation of Kron (198) fluxes from forced single epoch g filter detections.
gFKronMag	AB magnitudes	REAL	4	-999	Magnitude from mean Kron (1980) flux from forced single epoch g filter detections.
gFKronMagErr	AB magnitudes	REAL	4	-999	Error in magnitude from mean Kron (1980) flux from forced single epoch g filter detections.

and similar entries in the same row for *rizy* filters.

The tables below with multi-epoch measurements are **not included in the DR1 database** but are included here for completeness.

PS1 Detection table fields contains:

Name	Unit	Data Type	Size	Default Value	Description
kronFlux	Janskys	REAL	4	-999	Kron (1980) flux.
kronFluxErr	Janskys	REAL	4	-999	Error on Kron (1980) flux.
kronRad	arcsec	REAL	4	-999	Kron (1980) radius.

ForcedWarpMeasurement contains:

Name	Unit	Data Type	Size	Default Value	Description
FkronFlux	Janskys	REAL	4	-999	Kron (1980) flux.
FkronFluxErr	Janskys	REAL	4	-999	Error in Kron (1980) flux.
FkronRad	arcsec	REAL	4	-999	Kron (1980) radius.

DiffDetection contains:

Name	Unit	Data Type	Size	Default Value	Description

DkronFlux	Janskys	REAL	4	-999	Kron (1980) flux.
DkronFluxErr	Janskys	REAL	4	-999	Error in Kron (1980) flux.
DkronRad	arcsec	REAL	4	-999	Kron (1980) radius.