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Photometry Data Model

Jonathan McDowell

Photometry model

- Spectrum model doesn't support data in magnitudes well
  - Need zero point to convert to fluxes
  - Need transmission curve to do color corrections
  - Otherwise, all the same metadata
  - Can consider photometry data as 1-point spectrum
- Complication: color data
  - What if have B-V only?
  - Even if have V and B-V, don't convert to V,B since systematic error on B-V is much smaller
  - Often have a set of filters taken at once.. or at least one right after the other, with some common metadata. Is the right model a 'photometry set' with either e.g. U B V R I   or V B-V V-R R-I U-B and say that a single value, B, is a special case of such a set?

Commonalities with Spectrum

- Carry over Spectrum model as base:
  - Curation, DataID with observational data
  - Spectral Coordinate, Bin hi/lo (as extent of band)
  - Flux (with errors, etc)
  - Characterization (Spectral, Time, Spatial, Flux)

Zero point model

- ## Suitable metadata
  - Flux in Jy corresponding to reference point for a standard spectrum
    - Flat in nu-Fnu is the most 'agnostic' choice?
    - Vega spectrum not a good global choice (horrible far outside visible range)
    - Can do color corrections via the trans. Curve
  - Reference point: 0 mag if flux in mag; ref value if in other units? e.g. ADU: Value of 50 ADU equals 103.2 mJy, or do we just require the ref point to be 1 in whatever linear units?
  - Name of band (J, SDSS g, IRAS2, etc)
    - Redundant with transmission curve? But, gives extra meaning. Must be optional
    - Controlled vocabulary? (UCDs not the way to go?)
  - Assumed standard spectrum (if not flat)… how to specify?

Transmission curve

- Transmission curve is an instance of Spectrum

- Units are /dimensionless/

- We only need relative transmission as fn of spectral coordinate

- Just need a pointer to current Spectrum model, no further work to do.

Proposed Photometry Utypes

- Photom.Zero.Value   Zero point flux value

- Photom.Zero.Unit   Unit of zp value (e.g. Jy)

- Photom.Zero.Ref   Magnitude or scale value that zero point corresponds to (default 0 mag)

- Photom.BandName   Optional name of band

- Photom.Zero.RefSpectrum Assumed spectrum for zero point (default: flat in nu-Fnu)

- Photom.TransCurve   Pointer to trans curve Spectrum (ivo:// or internal reference – how?)

  - Plus, all the Spectrum utypes

But where does it fit?

- Extend Characterization model by adding Photom entries in CharacterizationAxis for Flux?
  - Most natural choice... but then we have to change Char model rather than just extend Spectrum
- Keep as separate lump in Spectrum top level?