

Photometry DM Working Draft 0.2

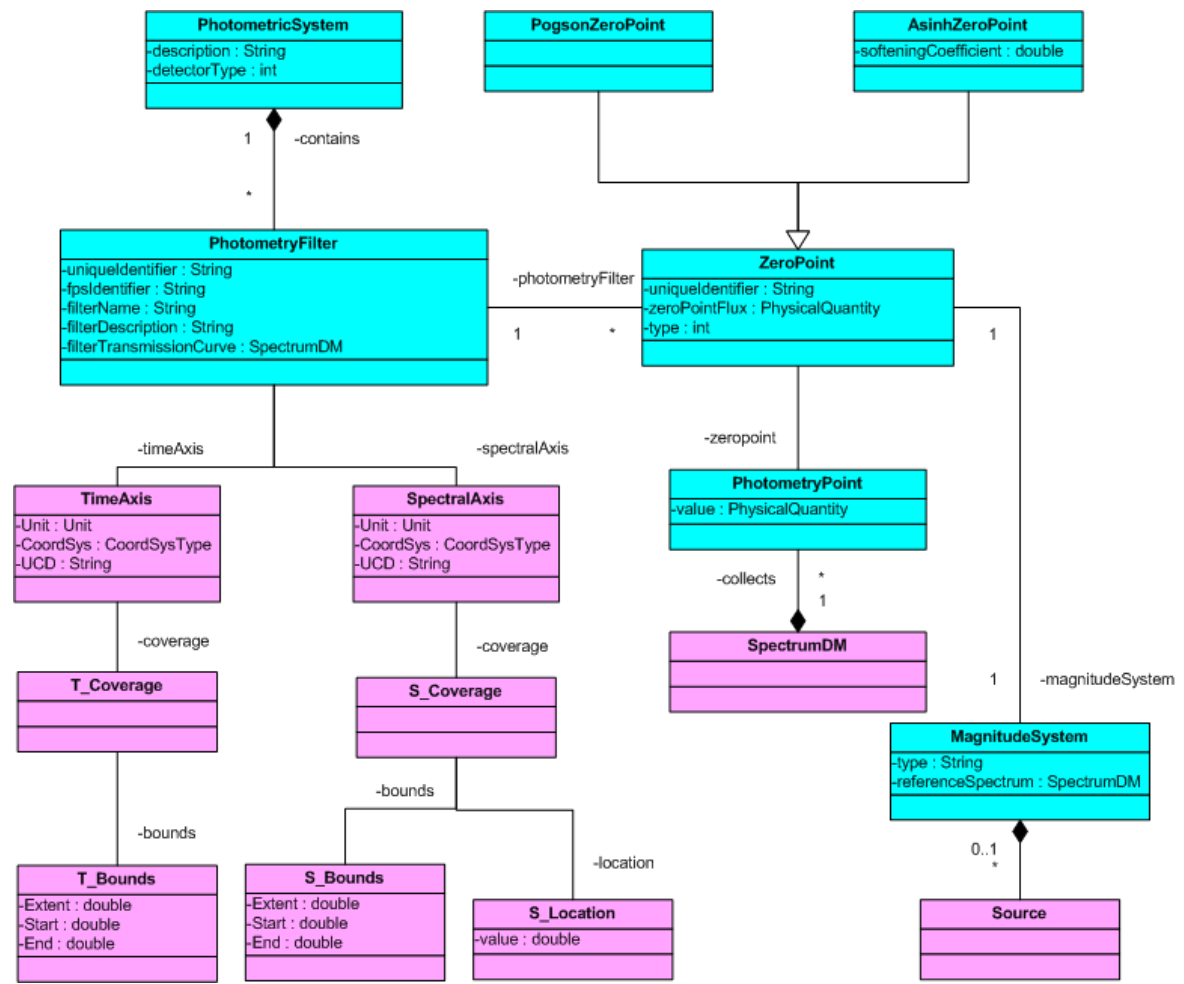
Jesus Salgado

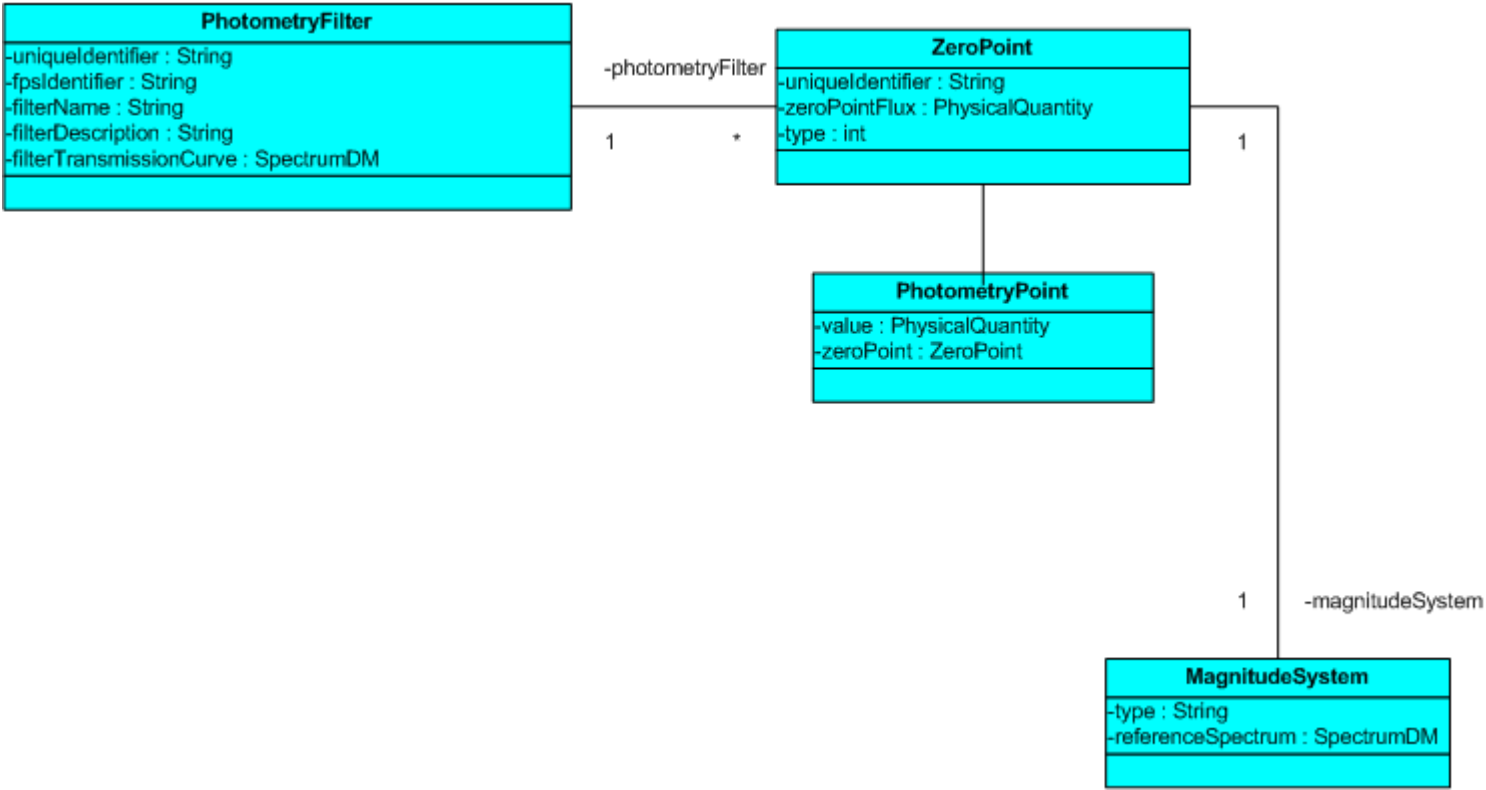
Jesus.Salgado@sciops.esa.int

ESAVO/ESA

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- Task to include photometry data in VO context
- This is an old and recurrent request of astrophysical community. One of the main topics raised during community workshops. One of the topics raised by the IVOA Take-up Committee
- Effort focused in adding what it was missing from current known specifications (Spectrum DM & Characterization)
- Links to other IVOA DMs should be used whenever is possible
- To create this DM authors from different groups have collaborated:
- P. Osuna & D. Baines (ESAVO), C. Rodrigo (SVO), M. Louys & M. Allen (Strasbourg/CDS) & E. Hatziminaoglou (ESO)
- Draft was reviewed by EuroVO Science Advisory Committee so we get good inputs and ideas from scientific point of view

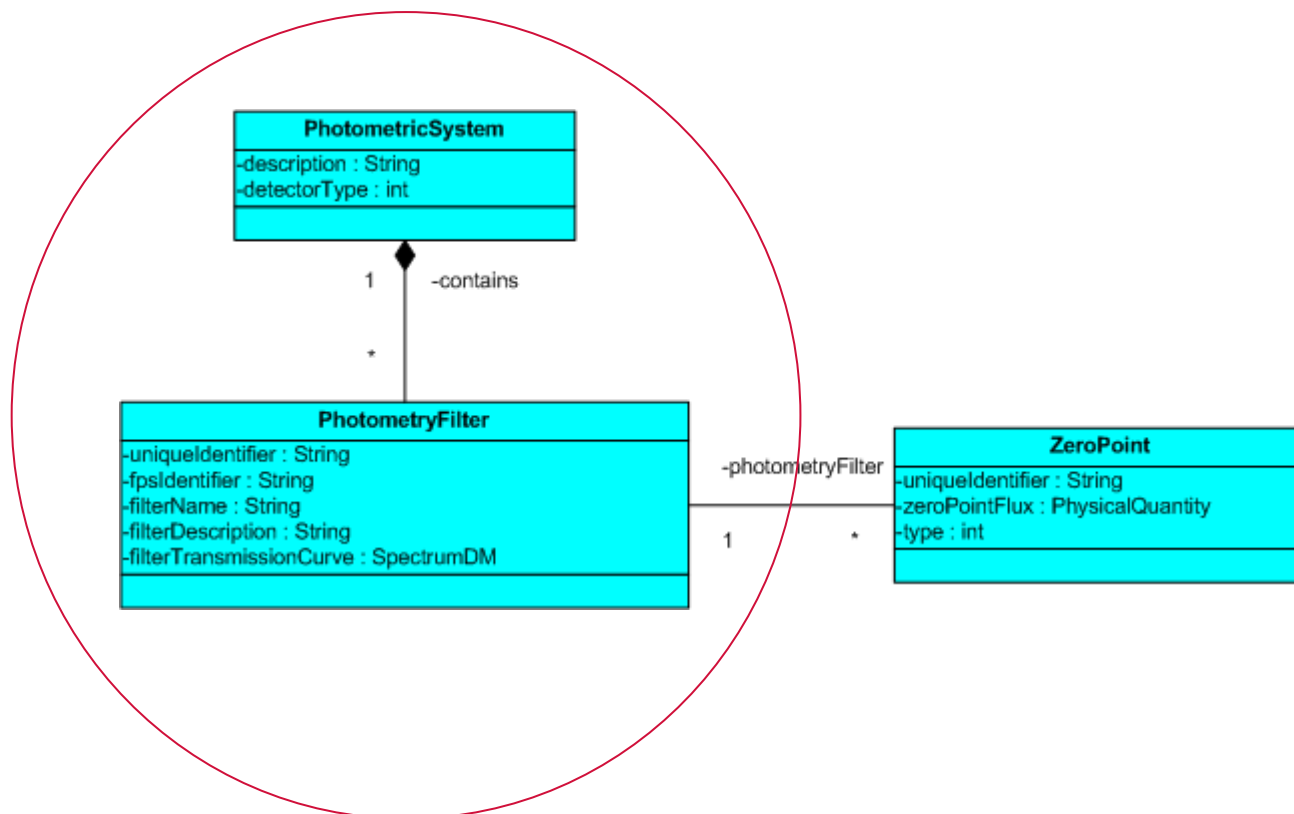




- A photometry filter could have more than one zero point associated. This is not only for nightly zero points but, e.g. by the use of different magnitude systems (VegaMag, ABMag, STMag). Although this is quite unusual in space based observatories, this is more common in ground base ones
- There are two basic options to handle this multiplicity:
 1. Define a Photometry Filter per zero point and magnitude system include it in the PhotometryFilter class
 2. Define a class zero point that could be used to connect a point with its respective magnitude system and photometry filter
- Second option looks more consistent from the data modeling point of view, although it could make the model more complex (visually)

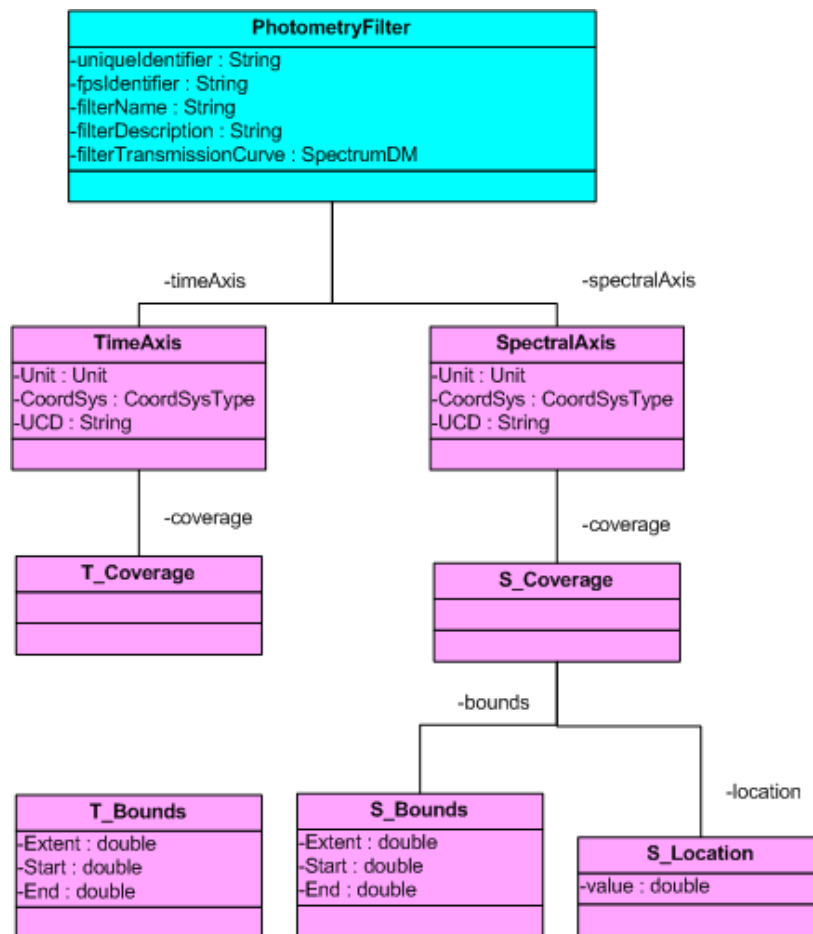
Photometry DM v0.2 (III)

Use Case: NVO Photometry Filter Service



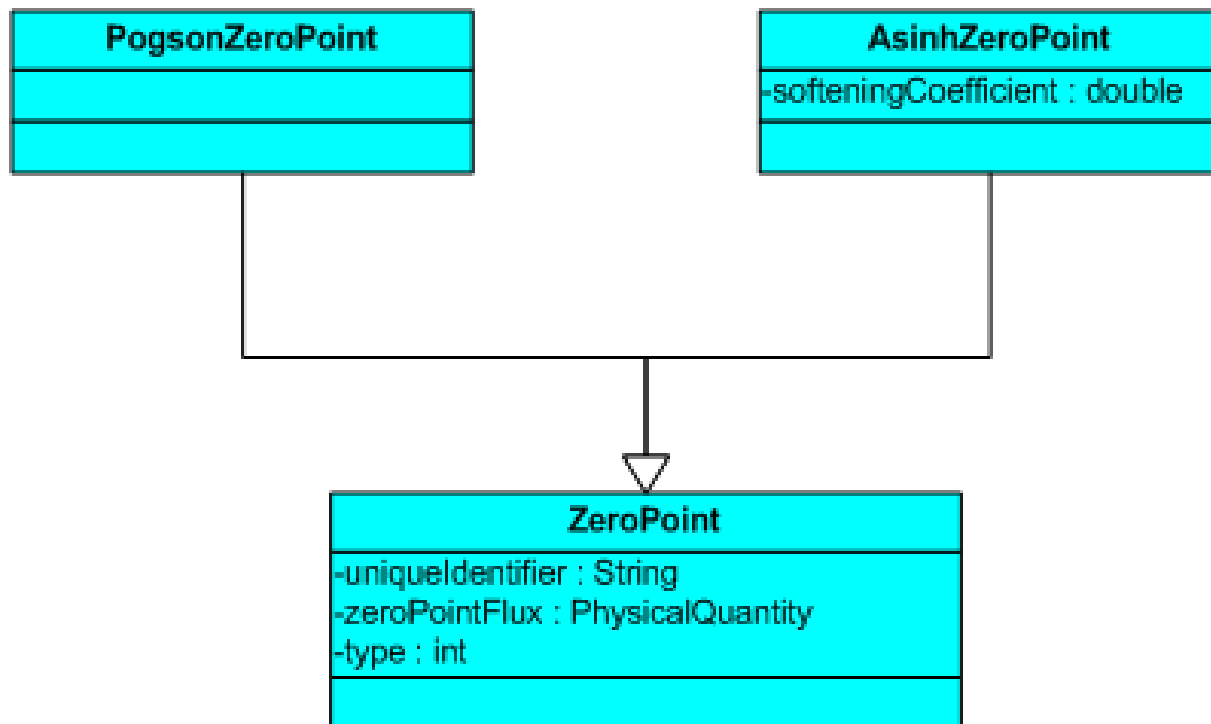
Photometry DM v0.2 (IV)

Links to Characterization



Photometry DM v0.2 (V)

Magnitudes versus Luptitudes

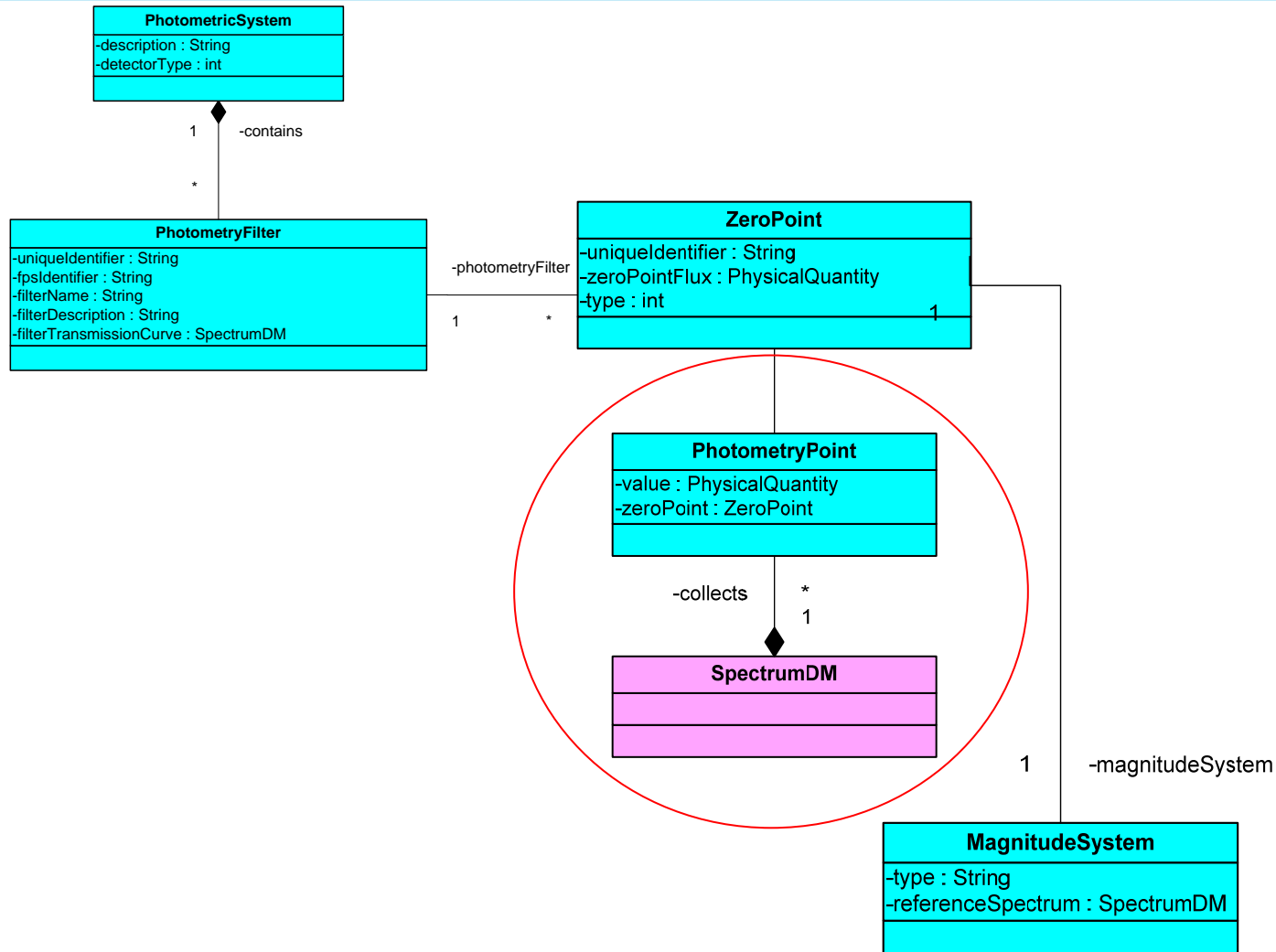


- “Magnitudes within the SDSS are expressed as inverse hyperbolic sine (or asinh) magnitudes, described in detail by [Lupton, Gunn, & Szalay \(1999\)](#). They are sometimes referred to informally as *luptitudes*. The transformation from linear flux measurements to asinh magnitudes is designed to be virtually identical to the standard astronomical magnitude at high signal-to-noise ratio, but to behave reasonably at low signal-to-noise ratio and even at negative values of flux, where the logarithm in the [Pogson magnitude](#) fails”
- Although this is quite SDSS dependent, SDSS is one of the main resources of magnitudes, so support to asinh magnitudes is needed

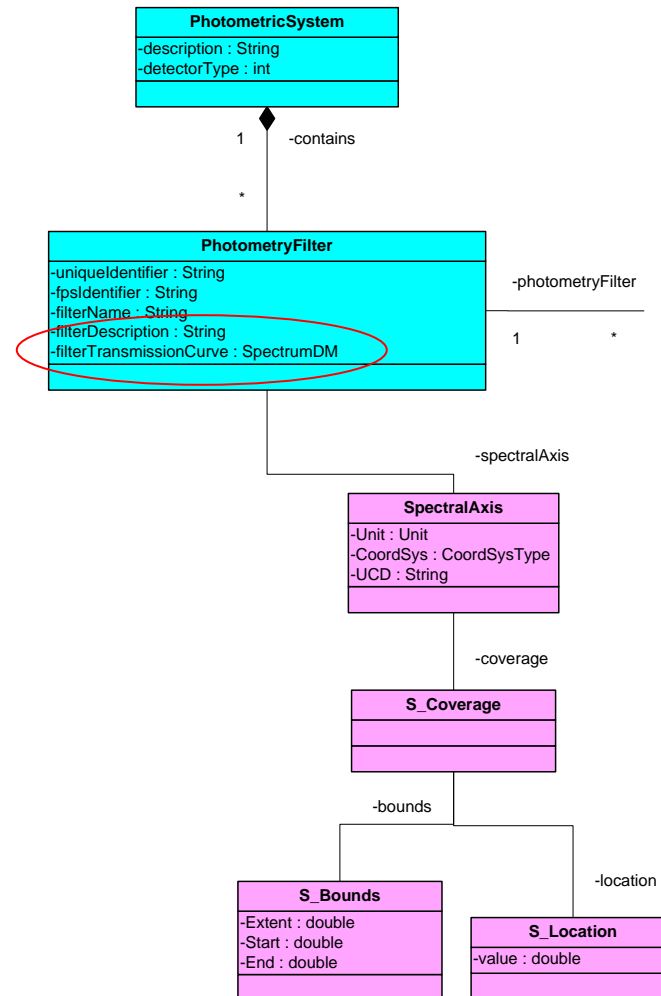
$$m = \frac{-2.5}{\ln(10)} \left[\sinh^{-1} \left(\frac{f}{2bf_0} \right) + \ln(b) \right] \qquad \frac{f}{f_0} = 10^{-m/2.5} \left[1 - b^2 \cdot 10^{2m/2.5} \right]$$

- Two options here:
 1. Add b (softening coefficient) to the zero point class, so b=0 is Pogson and b>0 Asinh
 2. Extend Zero Point class
- First approach is simple although it is only really useful when (and only when) the types of zero points do not increase too much

Photometry DM v0.2 (VI): Use Case: discovery of data



Photometry DM v0.2 (VI): Use Case: Synthetic photometry



- Working Draft v0.2 has been released for comments to the working group
- WD is focused on the needed classes to handle photometry data
- It fulfills many of the use cases needed in the photometry field
- Implementations already in place
- Main topics identified as to be developed:
 1. Better integration with Spectrum DM
 2. Serialization examples
 3. Integrate ideas from VAO (see next presentation) and modify model accordingly to create a DM that satisfy the needs of all IVOA partners

THANK YOU

Jesus Salgado

PHOTOMETRY DATA MODEL V0.2

Jesus.Salgado@sciops.esa.int