

# Photometry DM v0.3 SED Use Case

**Jesus Salgado**

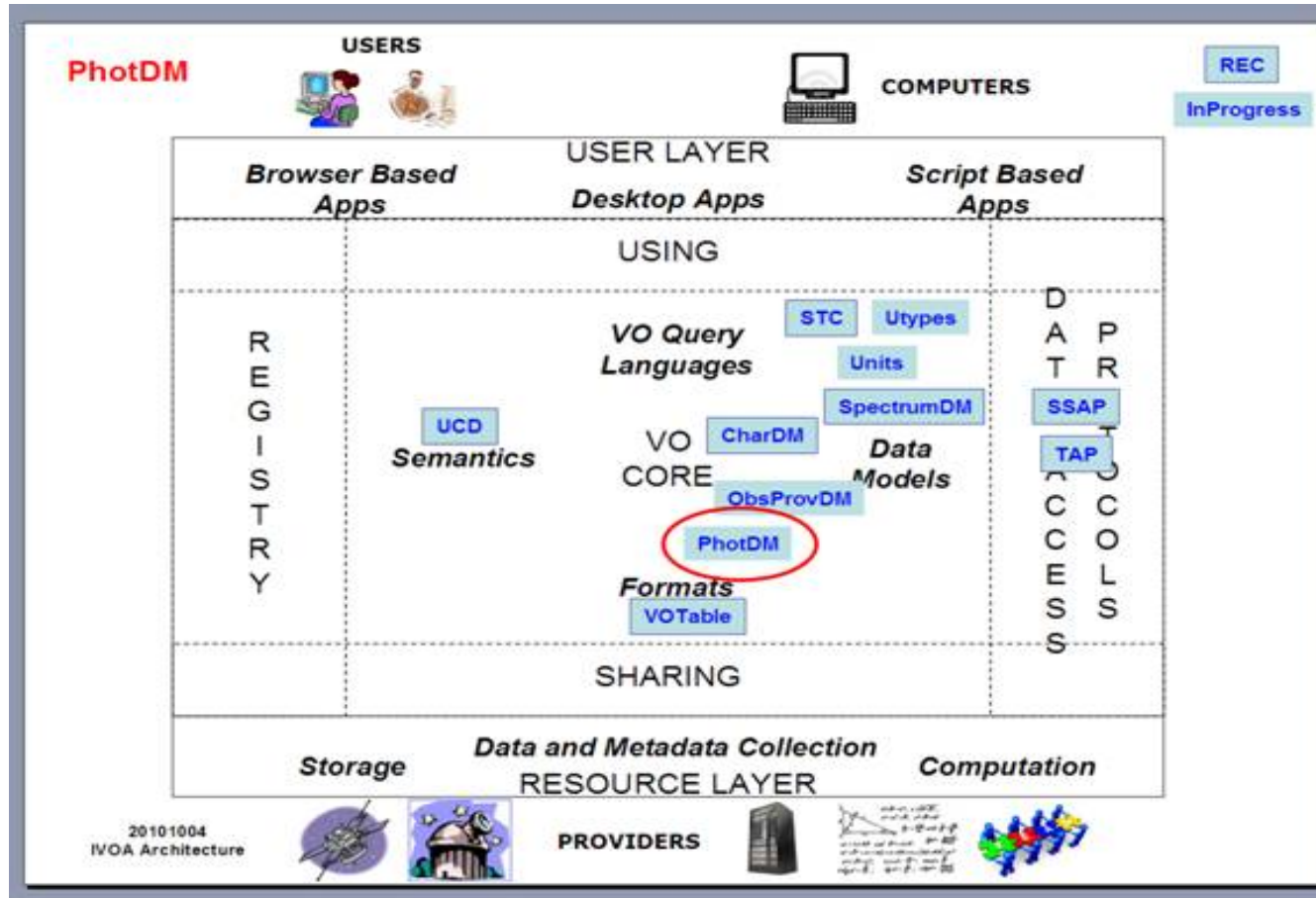
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ESAVO/ESA

17/05/2011

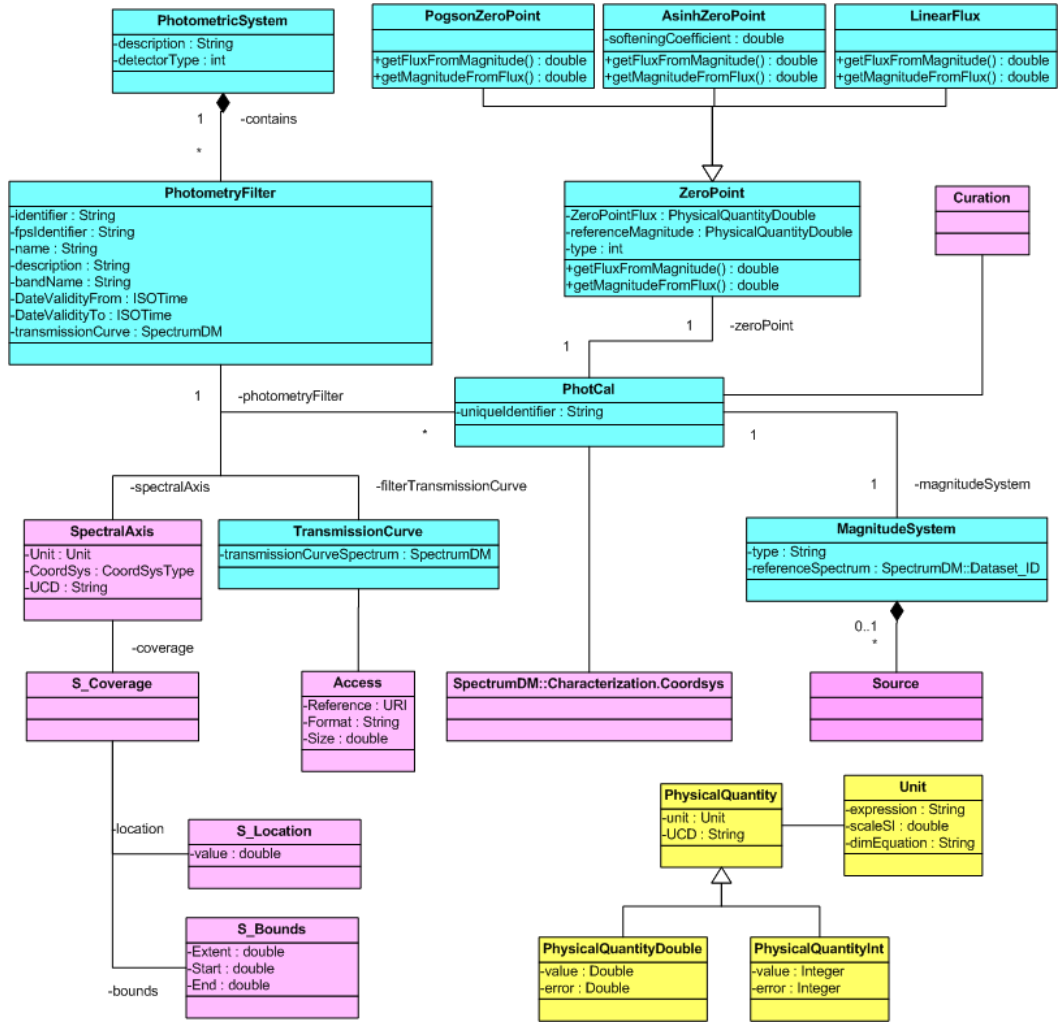
- Required component of the IVOA SED effort
- Effort focused in adding what it was missing from current known specifications (Spectrum DM & Characterization)
- DM authors covers main IVOA groups involved on photometry:
  - Pedro Osuna, Deborah Baines (ESAVO)
  - Carlos Rodrigo (SVO)
  - Mireille Louys, Mark Allen (Strasbourg/CDS)
  - Evanthia Hatziminaoglou (ESO)
  - Jonathan McDowell (VAO)
- Authors are technicians and scientists
- Draft was reviewed by EuroVO Science Advisory Committee so we get good inputs and ideas from scientific point of view

# Links to other IVOA specifications

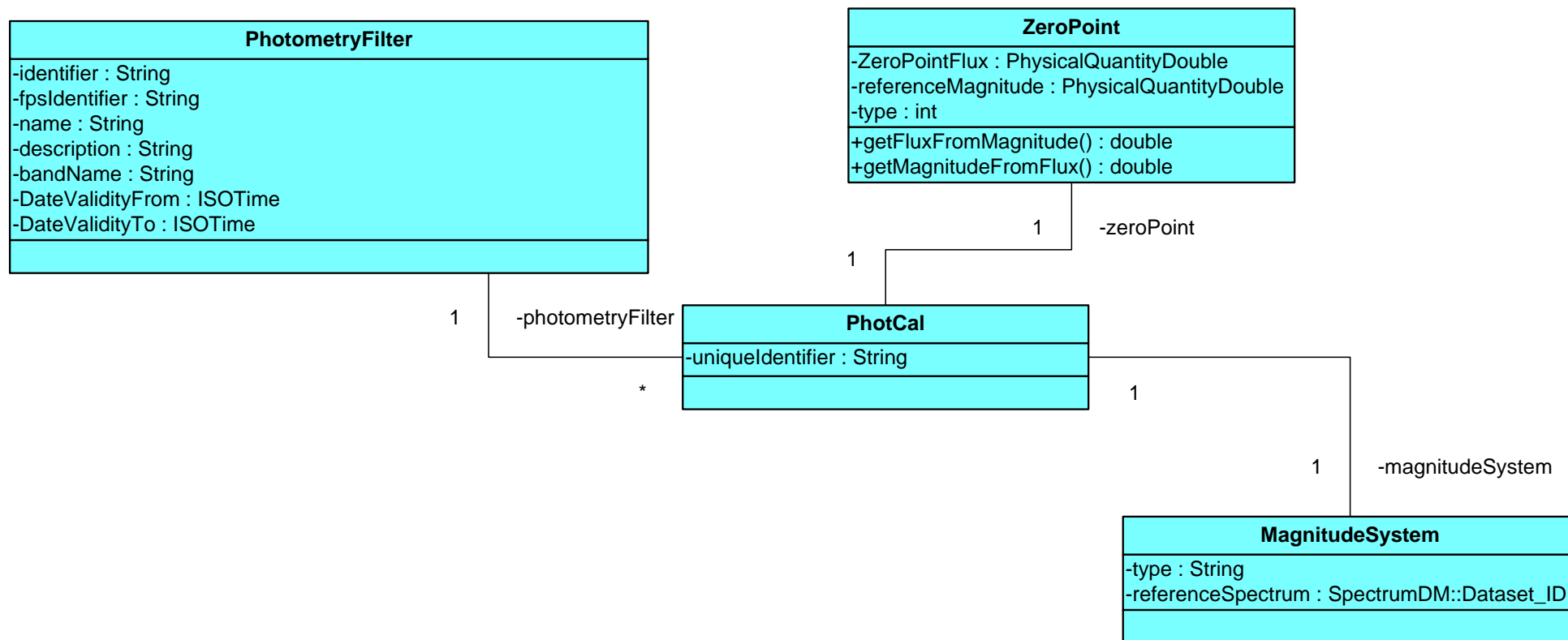


- During last interop meeting at Nara, some changes were implemented on the DM
- Main changes affect interconnection between different IVOA Data Models, so target of the different DMs is clarified
- PhotDM will cover the description of a photometric FILTER or/and photometric calibration or photometric system
- Spectrum DM will describe individual measurements of fluxes or simulation or theoretical spectrum
- SED DM will describe SEDs, observational or theoretical, which may be a single spectrum instances or aggregation of spectrum instances (some of them, photometric measurements)
- 3 different DMs. Filter/calibration, Spectrum and SEDs

# Photometry DM v0.3

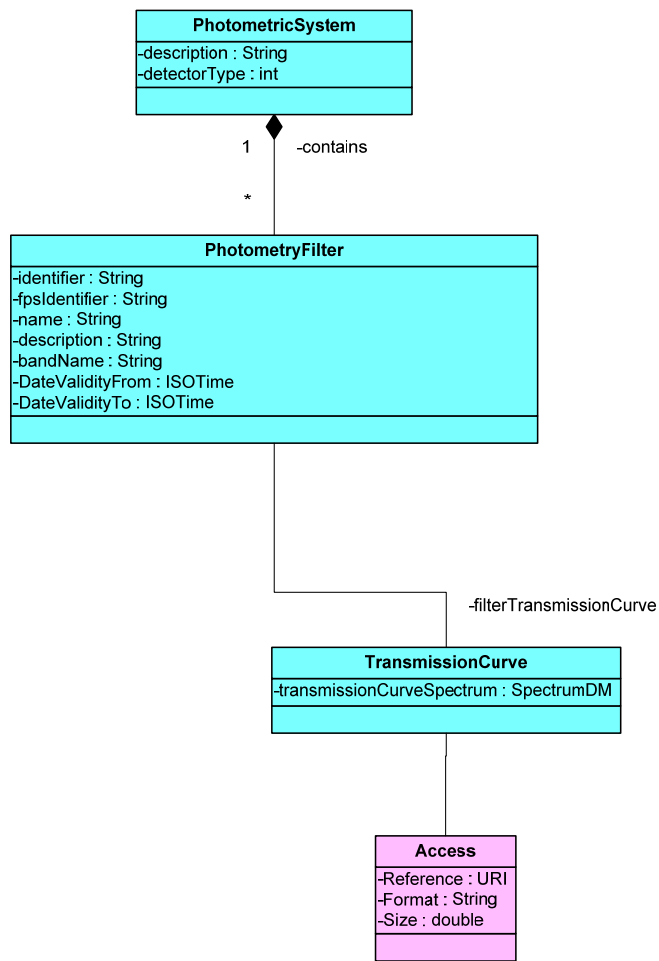


# Photometry DM v0.3 (II): PhotCal Object



- This object is the main entry point used by Spectrum DM (or any other DM that wants to describe measurements)
- It describes a photometric filter using a certain calibration configuration
  1. It has a photometric filter associated (band, transmission curve, photometric system, validity range, etc)
  2. It contains a Zero Point associated
  3. It is defined using a certain magnitude filter
- Spectrum DM will connect to this object whenever it wants to describe photometric points
- A certain PhotCal object would characterize the photometric point
- See Spectrum DM talk!

# Photometry DM v0.3 (III): Photometric Filter and Access



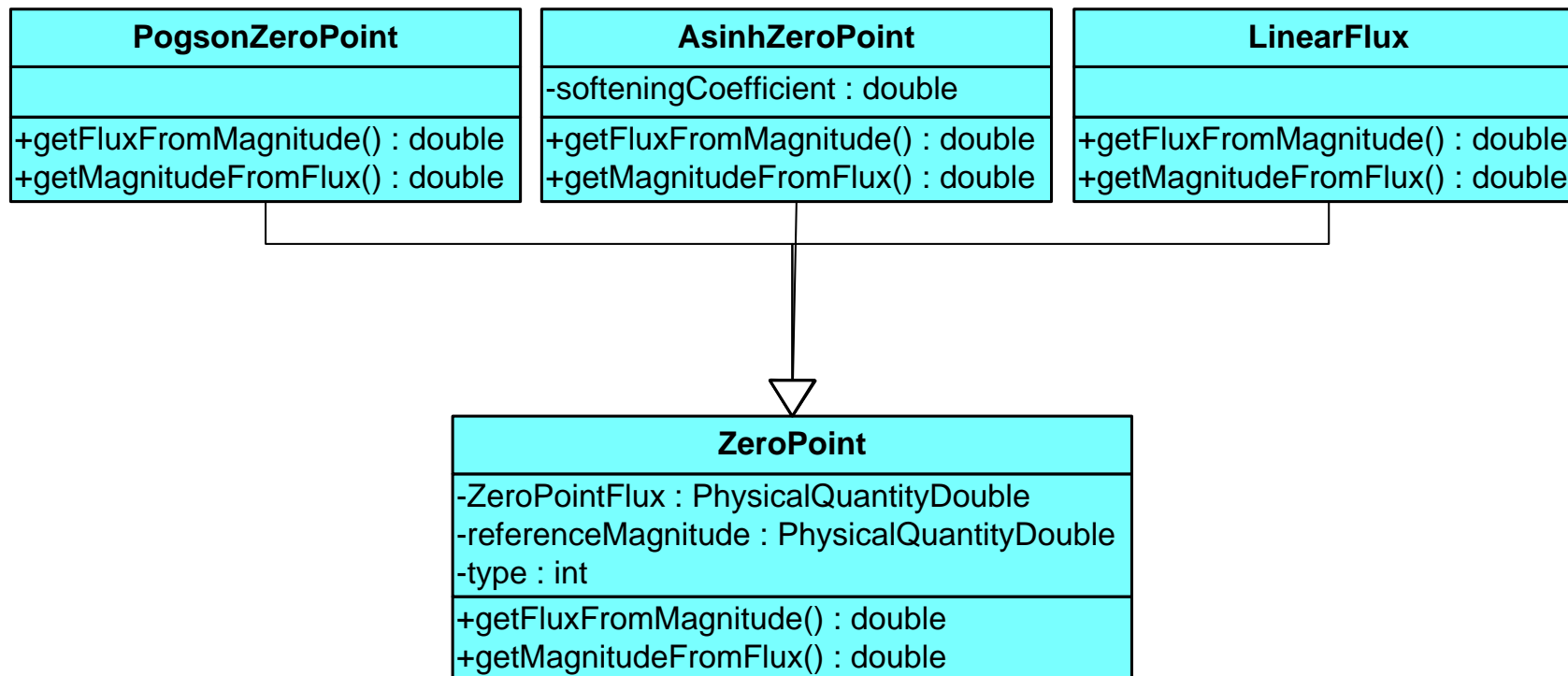


# Photometric Filter and Access

- Interrelation between Photometric System and Photometry Filter remains the same
- Transmission curve has been extracted as a new object type. Now it encloses:  
Transmission Curve Spectrum (type Spectrum) to allow the reuse of the different spectrum predefined components  
Access object. This has been taken from SSAP and Observation Core DM
- Access object contains an access URI, mime-type and size
- This was considered in the binomial Spectrum DM/SSAP as part of the SSAP DM but it has been added to the Photometry DM for simplicity (in the same way than in Observation Core DM)

# Photometry DM v0.3 (IV)

## Zero Point Extensions



# Zero Point Extensions

- Different types of zero points are described as different extensions of zero point
- Extensions, like in normal UML but as something quite new in IVOA DM, are not only described by new attributes but, also, by different implementations of the operations: `getMagnitudeFromFlux` and `getFluxFromMagnitude`

- Three different types of zero points described:

- Pogson

$$\frac{f}{f_0} = 10^{-(m-m_0)/2.5}$$

- Asinh (Iuptitudes)

$$\frac{f}{f_0} = 10^{-(m-m_0)/2.5} \left[ 1 - b^2 \cdot 10^{2 \cdot (m-m_0)/2.5} \right]$$

- LinearFlux

$$\frac{f}{f_0} = \frac{m}{m_0}$$

- This extension mechanism allows the easy integration of new types of zero points to cover future cases

# Photometry DM utypes

Utype	UCD+1	Meaning	Default value	Data type
Datamodel.name	meta.id	data model identification	PhotCalDM-v1.0	string
PhotometricSystem.description	meta.note	String representation Photometric system		string
PhotometricSystem.detectorType	meta.code	Type of detector (e.g energy or photon counter)	1	enum int
PhotometryFilter.identifer	meta.ref.ivorn	Unique identifier of filter within a Filter Profile Service (FPS)		string
PhotometryFilter.fpsIdentifier	meta.ref.ivorn	IVOA identifier of the Filter Profile Service		string
PhotometryFilter.filtername	meta.id;instr.filter	Filter Name in the instrumental configuration		string
PhotometryFilter.description	meta.note	Text description of the filter band		string
PhotometryFilter.transmissionCurve	meta.ref.ivorn	uri to the effective transmission curve		uri type
PhotometryFilter.bandName	instr.bandpass	Generic name for the filter spectral band		string
PhotometryFilter.SpectralAxis.unit	meta.unit	Unit of the spectral axis used to characterize it	angstrom	string
PhotometryFilter.SpectralAxis.UCD	meta.ucd	UCD for the nature of spectral axis wl, freq, energy	em.wl	string
PhotometryFilter.SpectralAxis.Coverage.Location.Value	em.wl;meta.main	Reference position along the spectral axis. Spectral coordinate of the Zero Point		string
PhotometryFilter.SpectralAxis.Coverage.Bounds.Extent	instr.bandwidth	Spectral axis extent of the filter		double
PhotometryFilter.SpectralAxis.Coverage.Bounds.Start	em.wl;start	Minimum value of the filter spectral coverage		double
PhotometryFilter.SpectralAxis.Coverage.Bounds.Stop	em.wl;.end	Maximum value of the filter spectral coverage		double

# Photometry DM utypes (II)

## PhotCal

PhotometryFilter.TimeAxis.Coverage.Bounds.Start	time.start	Time stamp for Start of validity for this filter in ISOTime format		string
PhotometryFilter.TimeAxis.Coverage.Bounds.Stop	time.stop	Time stamp for Stop of validity for this filter in ISOTime format		string
PhotometryFilter.DateValidityFrom	time.start	Time stamp for Start of validity for this filter in ISOTime format		string
PhotometryFilter.DateValidityTo	time.end	Time stamp for Stop of validity for this filter in ISOTime format		string
PhotCal.identifier	meta.ref.ivorn	Unique identifier of the Photometry Calibration instance within a FPS		string
PhotCal.ZeroPoint.Flux.unit	meta.unit	unit for Zero point flux	Jy	string
PhotCal.ZeroPoint.Flux.ucd	meta.ucd	ucd for Zero point flux	phot.flux.density	string
PhotCal.ZeroPoint.Flux.value	phot.flux.density	flux value at Zero point associated to this filter		double
PhotCal.ZeroPoint.referenceMagnitude.unit	meta.unit	unit for reference magnitude	mag	string
PhotCal.ZeroPoint.referenceMagnitude.ucd	meta.ucd	ucd for reference magnitude	phot.mag	string
PhotCal.ZeroPoint.referenceMagnitude.value	phot.mag	Reference magnitude used for zero point	0.0	double
PhotCal.ZeroPoint.type	meta.code	Type of zero point	0.0	enum int
PhotCal.AsinhZeroPoint.softeningParameter	obs.param	Correction parameter for luptitudes	0	double
PhotCal.MagnitudeSystem.type	meta.code	Type of magnitude system	VEGAMag	string
PhotCal.MagnitudeSystem.ReferenceSpectrum.uri	meta.ref.ivorn	Reference SED or spectrum for this magnitude system		uri type

# Implementations

- **Filter Profile Service (FPS)**

Service that allows the discovery of photometry filters. To be used by client applications for discovery purposes

One server implementation in place (SVO) – contact point Carlos Rodrigo

One Client implementation in place (VOSpec, development version)

**Pending:**

***Filter Profile Service Specification definition***

***Registry extension to allow the publication of these kind of services (and registration)***

- **Cone Search with Photometry Extension**

More than 200 server implementations (VizieR catalogs) – contact points

F. Ochsenbein and S. Derriere

One Client implementation in place (VOSpec, development version)

Note on capability description sent to IVOA by Sebastien (See presentation!)

**Pending:**

***Registry Capability Definition to allow the publication of these kind of services (and registration)***

- Working Draft v0.3 has been released for comments to the working group
- **Main topics added to this version:**
  - Integration with Spectrum DM. Clear DM boundaries definition
  - Integration of ideas from VAO
  - Serialization examples
  - Better definition of magnitude types extensions
- **Nothing Pending on Data Model!**
  - Comments from working list to be integrated
  - Then, if no major issue found, RFC process
- Now concentration in implementations (and possible feedback)
  - Catalogs
  - Filter Profile Services
  - Registration

**THANK YOU**

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PHOTOMETRY DM DRAFT 0.3: STATUS AND ISSUES

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