The SED Science Use Case

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- An SED is a plot of flux density versus frequency/ wavelength/energy
- It can include any data which have been calibrated (in units of energy/area/time/frequency)
- A flux-calibrated spectrum is an SED, but usually an SED used for astronomical purposes will cover a frequency range > than that covered by a single spectrum
- Astronomers uses SEDs to, e.g.,:
  1. identify the physical process(es) responsible for the emission
  2. determine the source class and its distance

Spectral Energy Distribution (SED)

Fritz, Franceschini & Hatziminaoglou 2006

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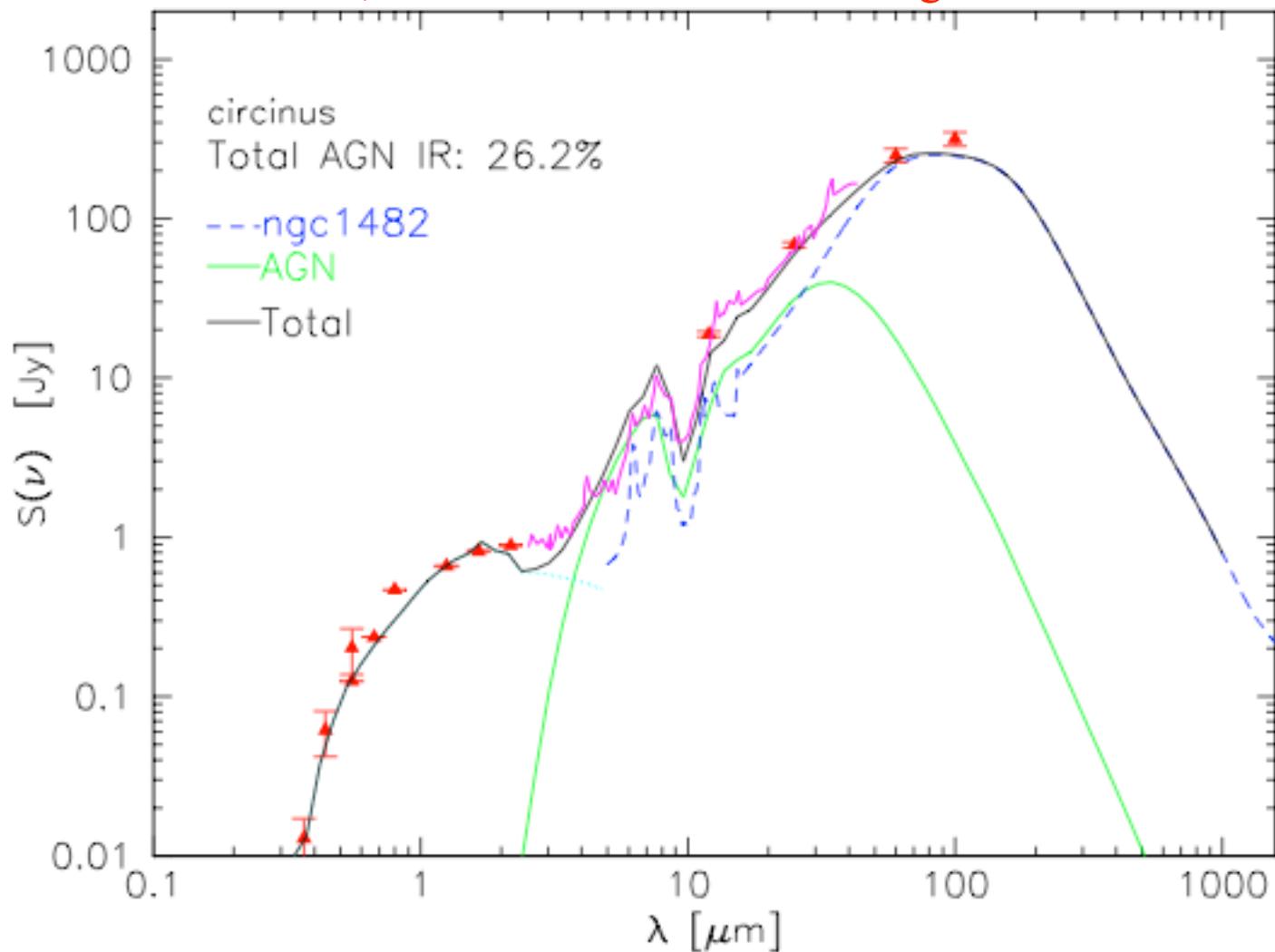
ED

Building a Spectral Energy Distribution (SED) in the VO

- If all data are already in flux units, then there is no problem if VO spectral tools can deal with them (➔know the relevant frequency and understand the format)
- If some of the data points are in magnitudes, then they need first to be converted to fluxes
- In the simplest, and most common, cases, since m= - 2.5 * log(flux) + K, conversion to flux requires only 1 number: the "zero point"; the flux will then need to be associated to the effective frequency
- For more accurate results, one needs to do a calculation which involves the instrument transmission curve and the source spectrum

Catalogue 1 ra_1, dec_1, $m_{1,1}$, ..., $m_{1,m}$, $err\_m_{1,1}$, ..., $err\_m_{1,m}$, $ID_{1,1}$ ... $ID_{1,m}$

Catalogue 2 ra_2, dec_2, $f_{2,1}$, ..., $f_{2,k}$, $err\_f_{2,1}$, ..., $err\_f_{2,k}$, $ID_{2,1}$, ... $ID_{2,k}$

Catalogue n ra_n, dec_n, $m_{n,1}$, ..., $m_{n,l}$, $err\_m_{n,1}$, ..., $err\_m_{n,l}$, $ID_{n,1}$, ... $ID_{n,l}$

Photom DM

extended capability

"PhotTAP"

$m \Rightarrow f$

$f \Rightarrow f$

Spectrum 1

spectrum DM

Spectrum 2

Spectrum j

RA, Dec or Target

SED DM ~ spectrum DM

SSA

query

combine data

SED

TAP   CS
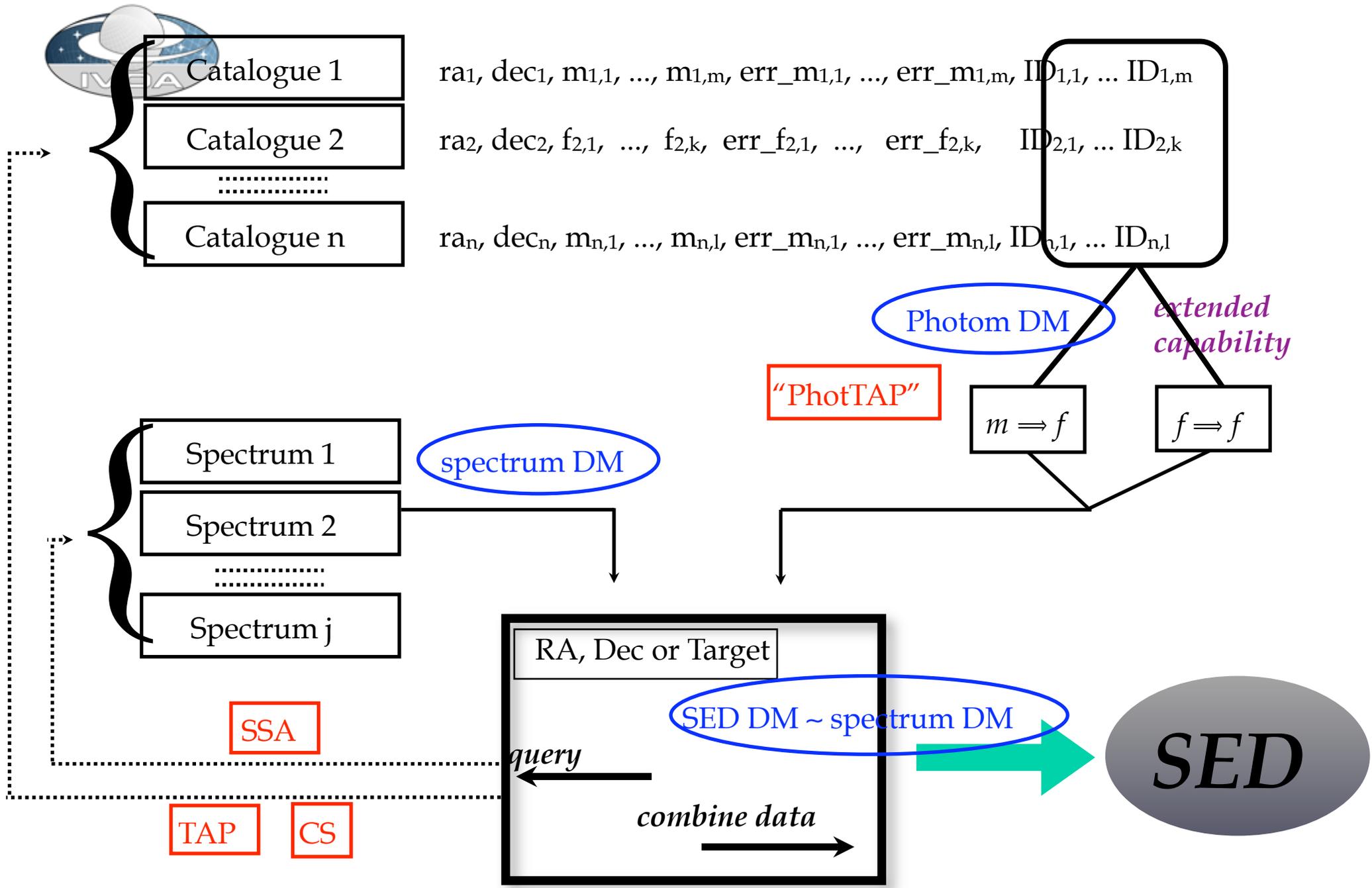
- A photometry Data Model
  - ✓ one IVOA working draft and one IVOA note
- The right metadata information (e.g., frequency) attached to catalogues
  - ✓ through simple extension of available standards (e.g., additions to existing services [Cone Search])?
- Do we need an SED Data Model or can we leave with what we have?

- VAO SED requirements
- SED and DM
- SED and DAL
- SED at Euro-VO ICE Technology Forum
- Discussion