What to expect from Gaia (E)DR3: Photometry and low-resolution spectra

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EDR3: G, G_{BP}, G_{RP} Photometry

Mean photometry

	Sources	Uncertanties
G-band	<1.8 billion	0.25 mmag at G<13 1 mmag at G=17 5 mmag at G=20
G_{BP} and G_{RP}	~85%	1 mmag at G<13 10 / 5 mmag at G=17 100 / 50 mmag at G=20

Based on the scatter of epoch measurements per source

Photometric system definition

- G, G_{BP} and G_{RP} photometric passbands

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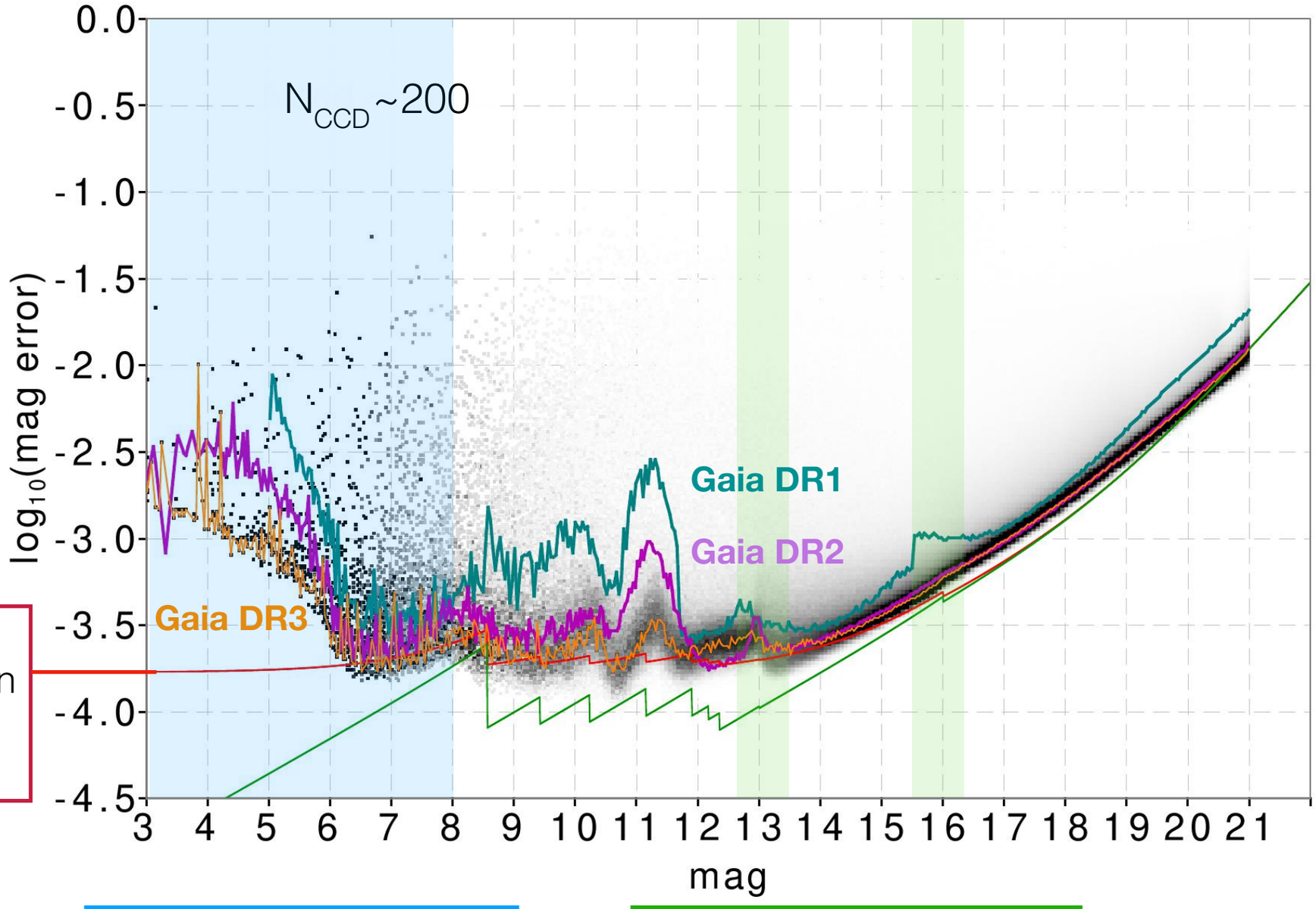
Precision of the mean photometry

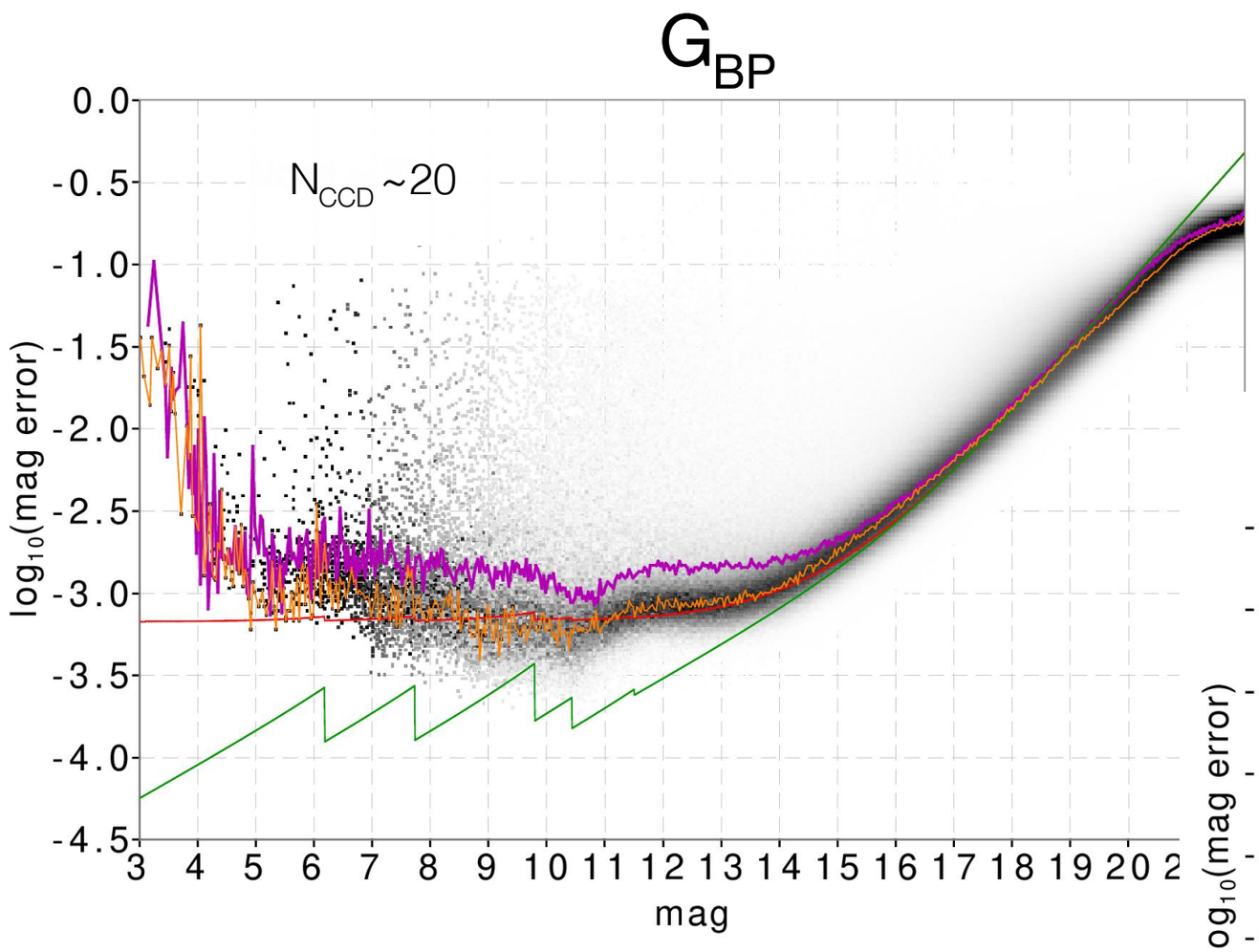


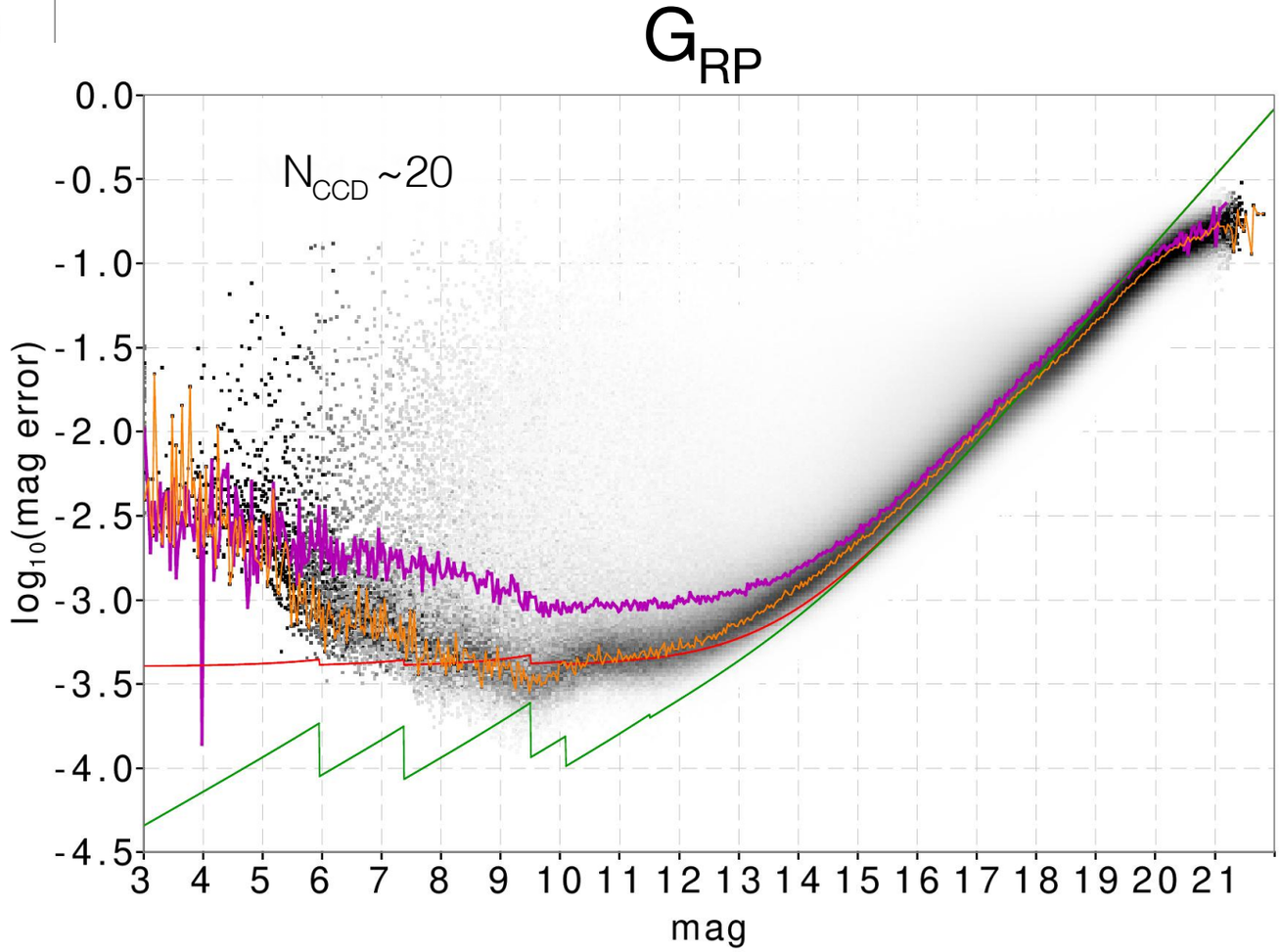
2 mmag calibration floor on individual CCD measurements

Saturation effects & problematic calibrations due to fewer calibrators

Change in windowing scheme, photometric system inhomogeneities

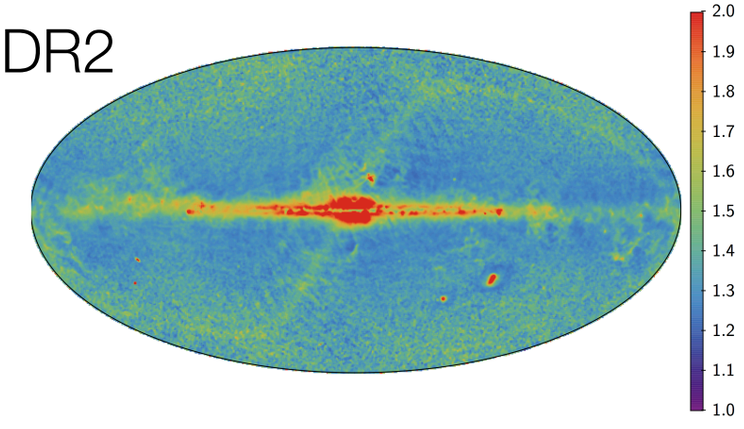
Precision of the mean photometry





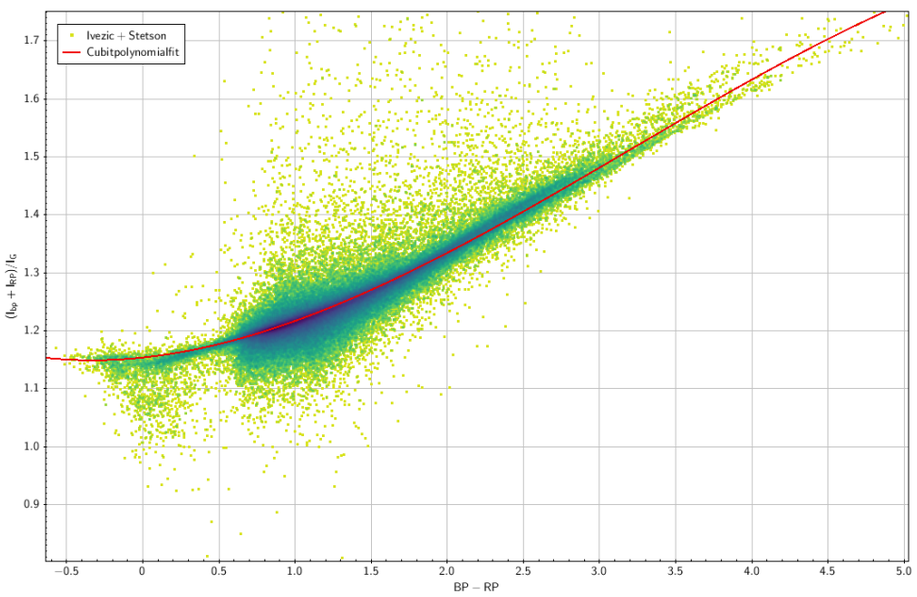
Quality metrics

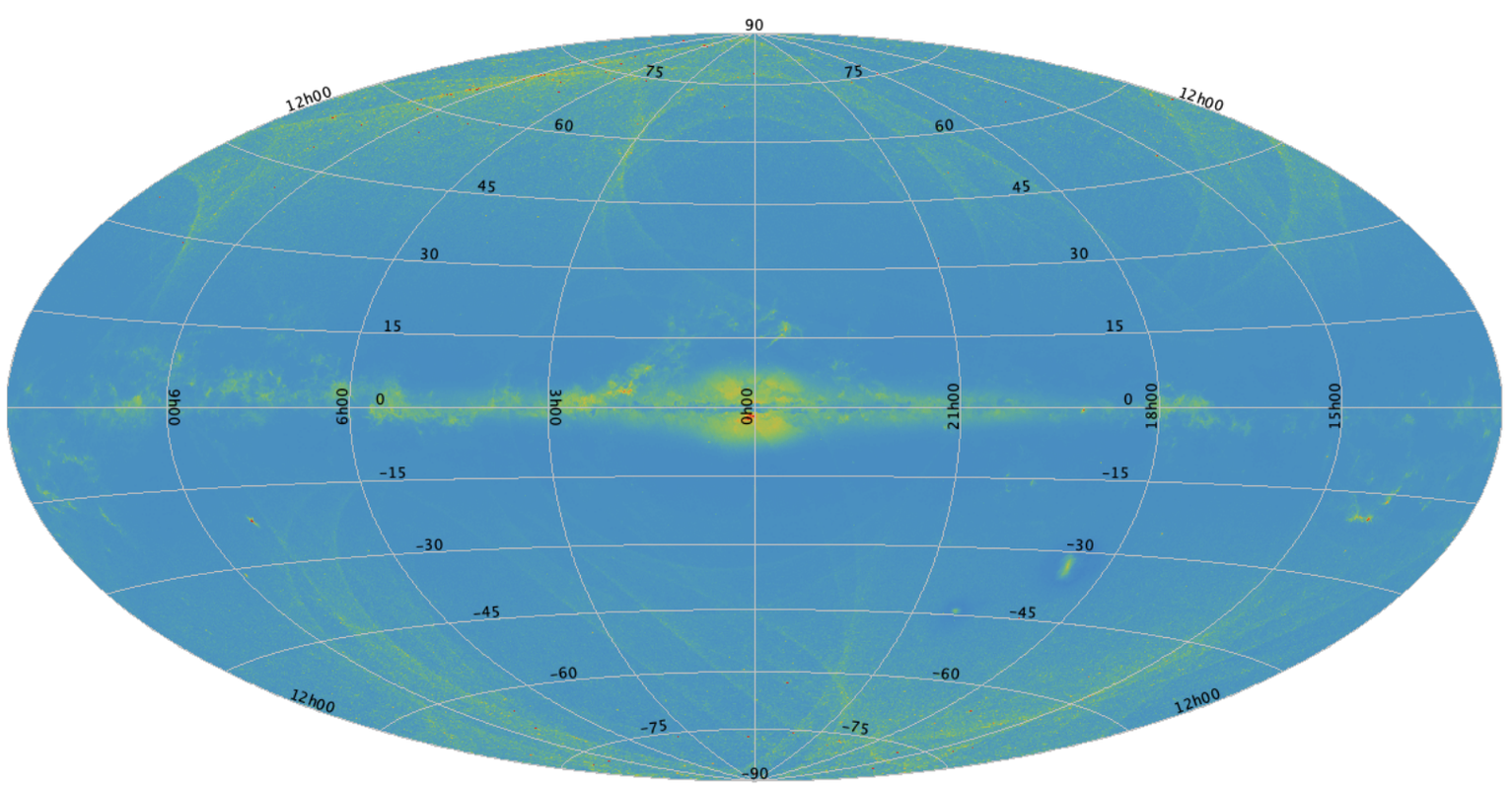
DR2



- Flux excess factor defined as the ratio between the sum of G_{BP} and G_{RP} fluxes and the G flux.
- The smoother sky distribution is a clear sign of the improvements in the BP and RP calibrations in contaminated and crowded regions.
- Refer to the Gaia EDR3 papers for more details on this and other quality metrics.

EDR3





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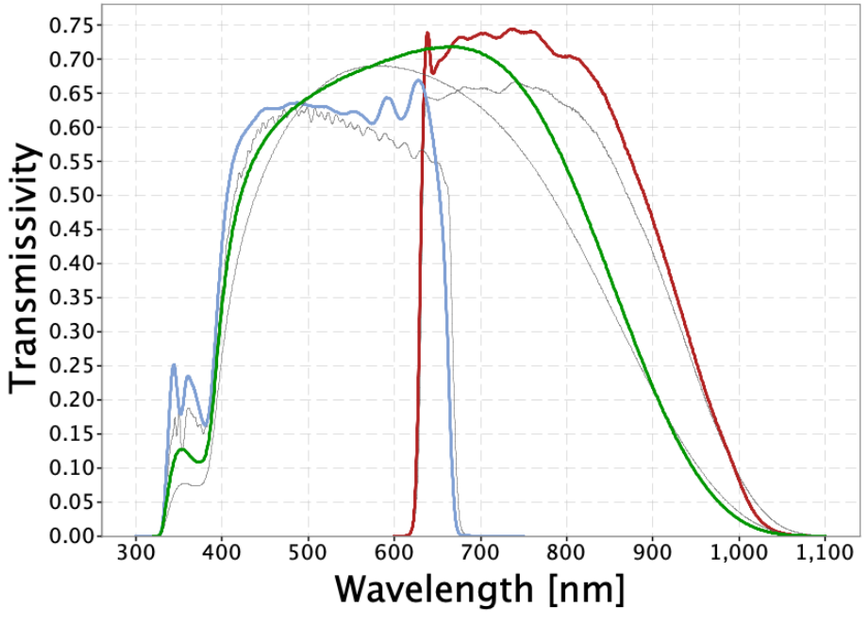
EDR3: Passbands

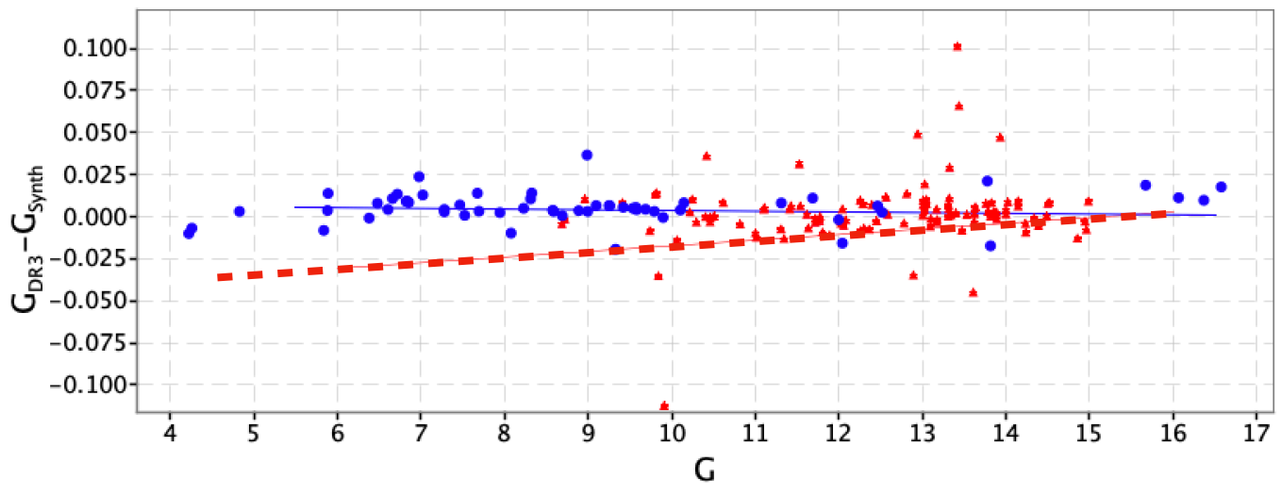


Essential to estimate the magnitude measured by a given instrument given the absolute spectrum of a source.

- Photometric passbands and zero-points in the Vega and AB systems will be released in advance of EDR3
- The Gaia EDR3 papers and on-line documentation will provide newly determined transformations between the Gaia photometry and other photometric systems.

The internal photometric system is NOT the same as for Gaia DR2.

No evidence for magnitude terms as reported for DR2 in Casagrande & VandenBerg 2018 and Weiler 2018



DR3: New products

Epoch photometry

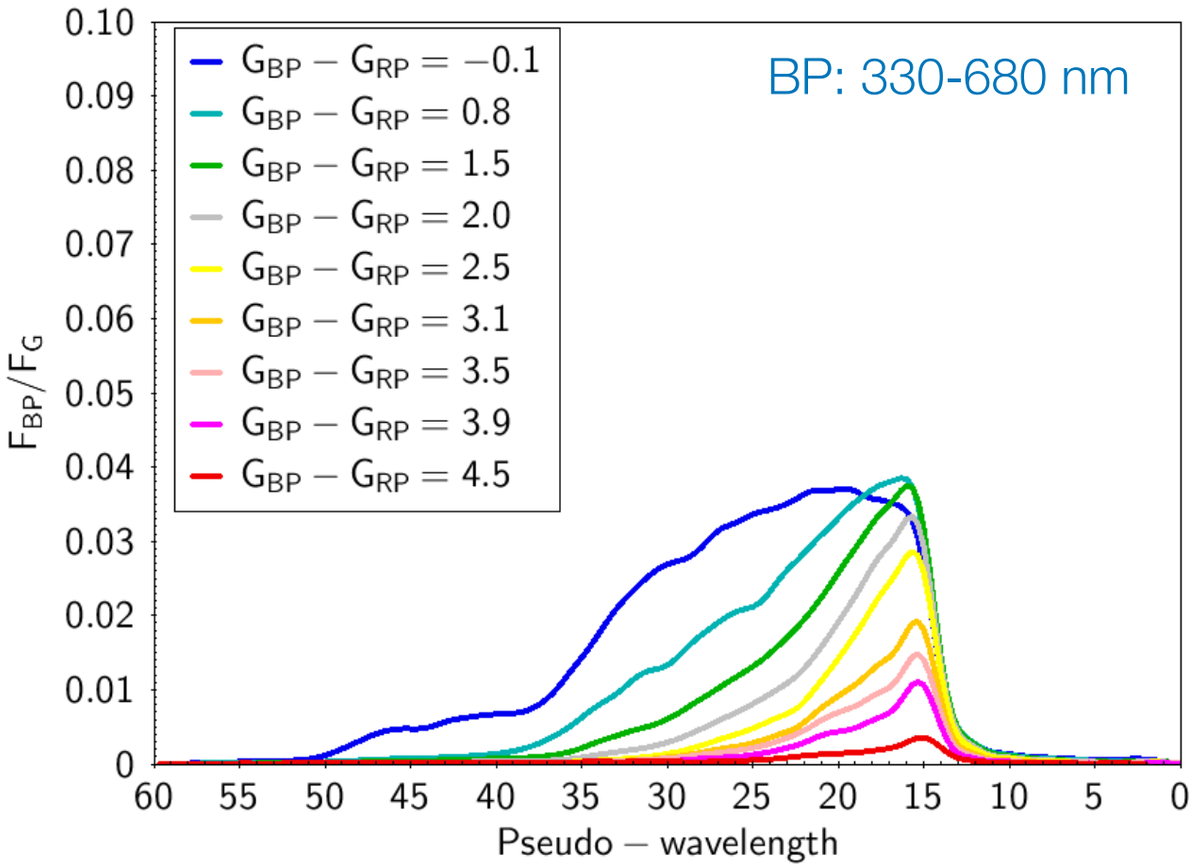
- Variable light-curves (more variability types, up to ~7 million photometric light-curves and classifications)
- Gaia Andromeda Photometric Survey (GAPS) (G, G_{BP}, G_{RP} light-curves for ~1M sources)

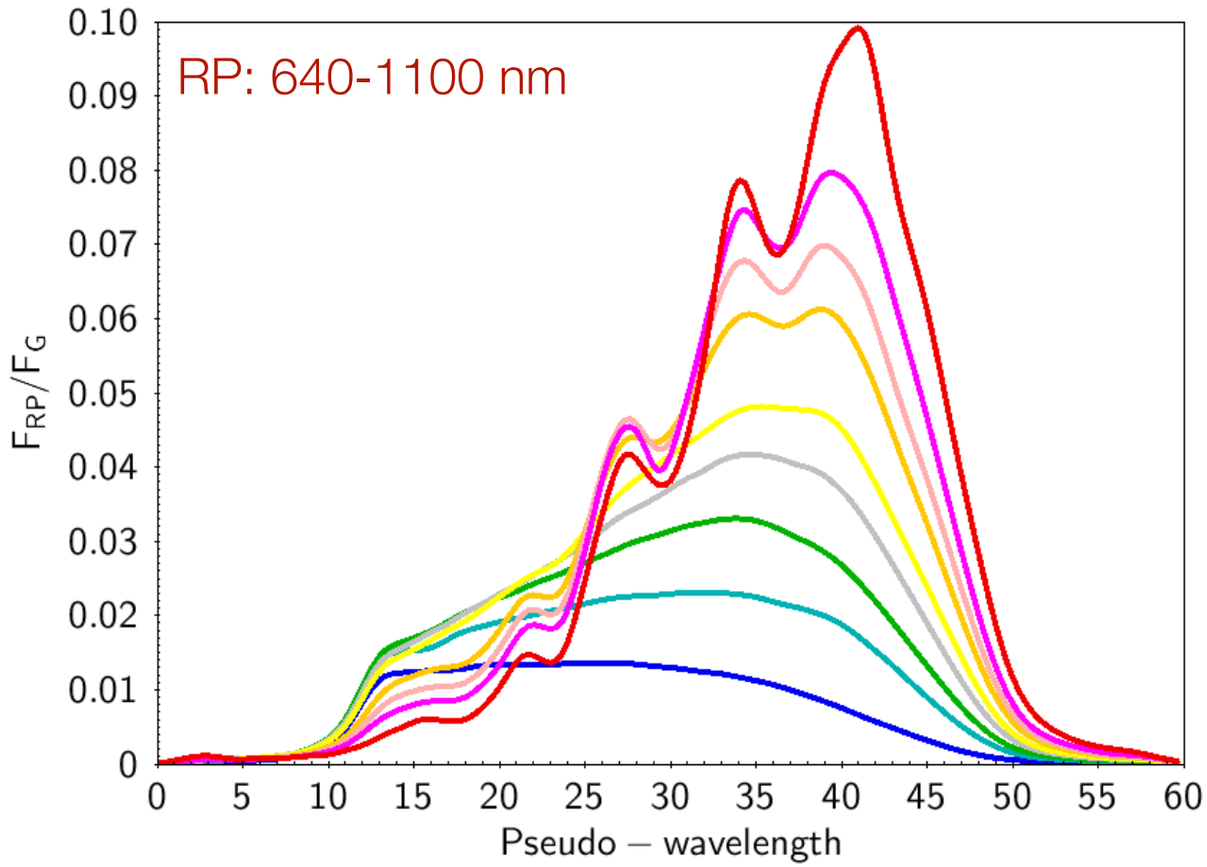
BP/RP low-resolution spectroscopy and related products

- Internally calibrated mean BP and RP spectra for at least 100M sources
- External calibration of the BP and RP mean instrument
- Astrophysical parameters
- Reflectances from BP/RP spectra of asteroids

DR3: Mean BP/RP spectra

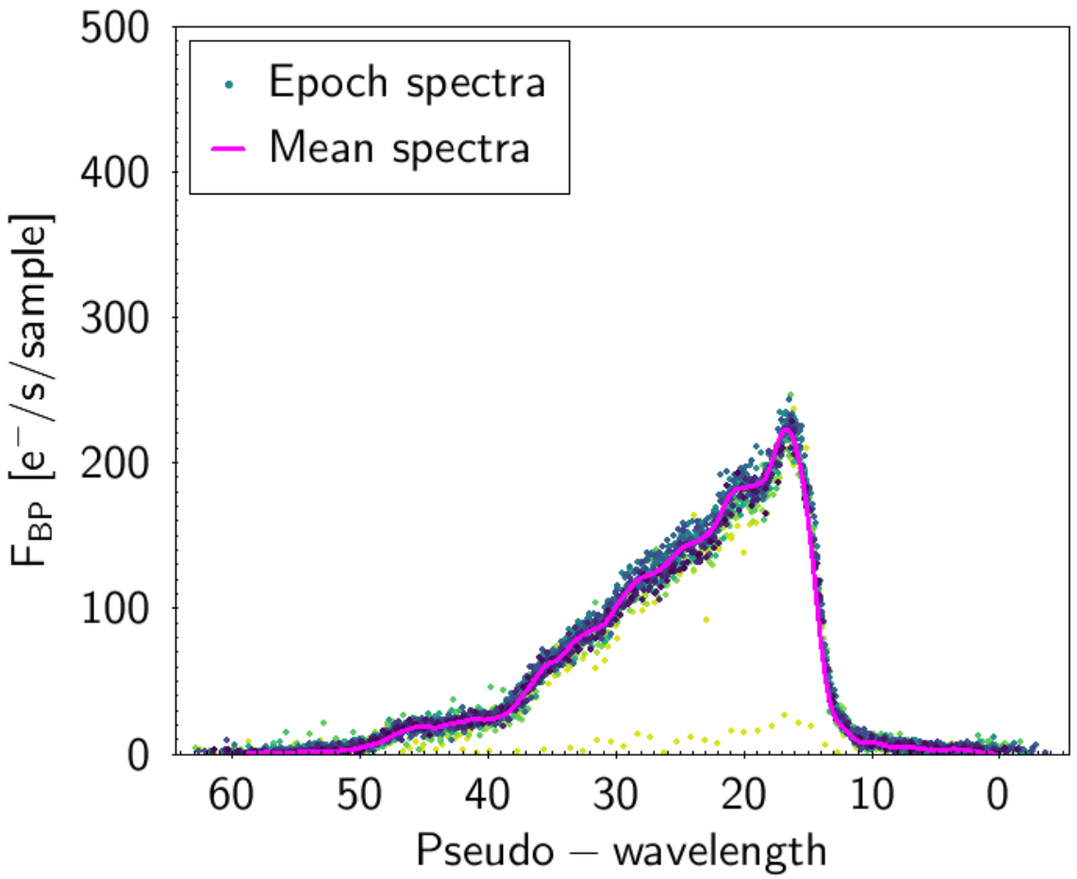
upcoming
IMAGE OF THE WEEK

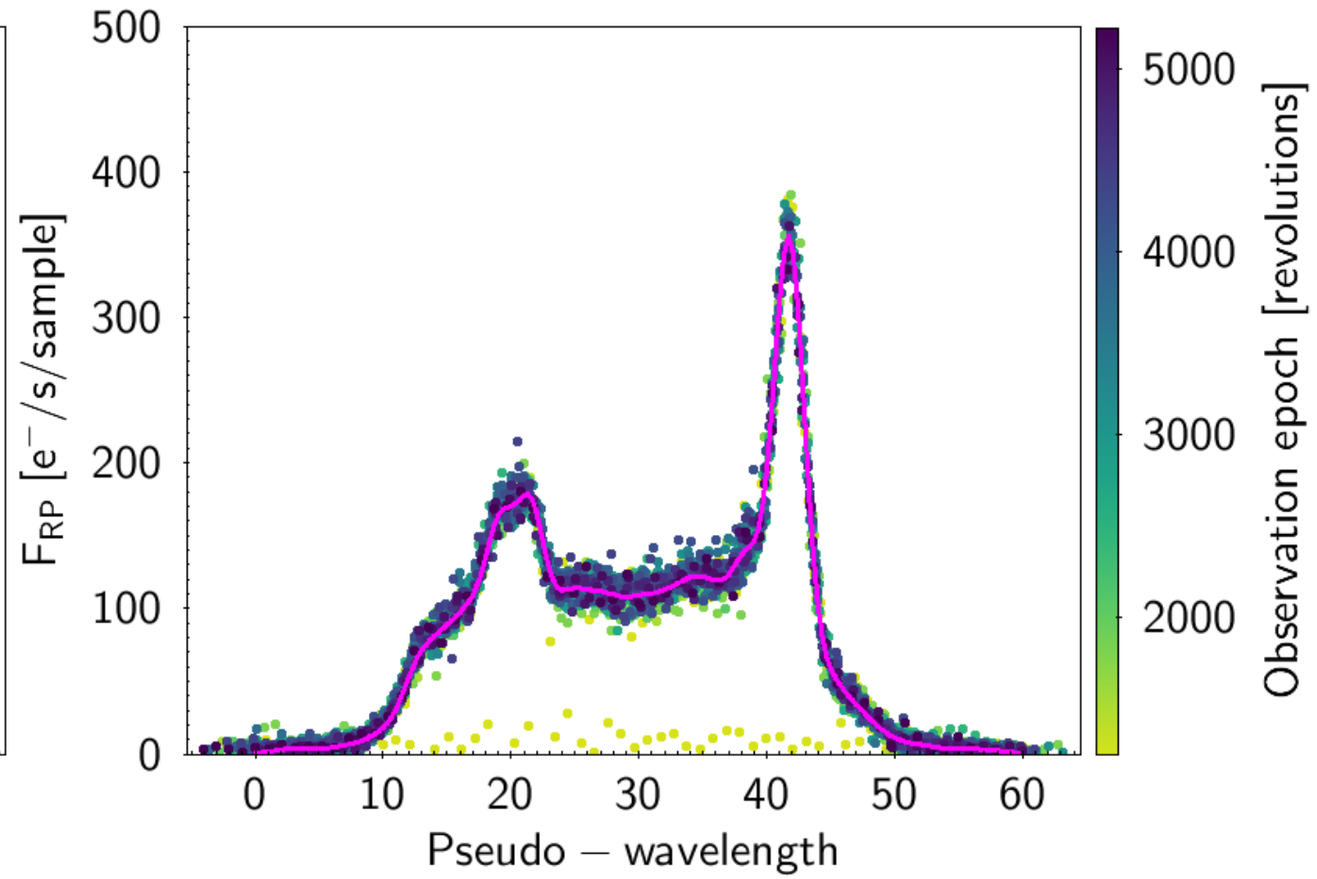




DR3: Mean BP/RP spectra

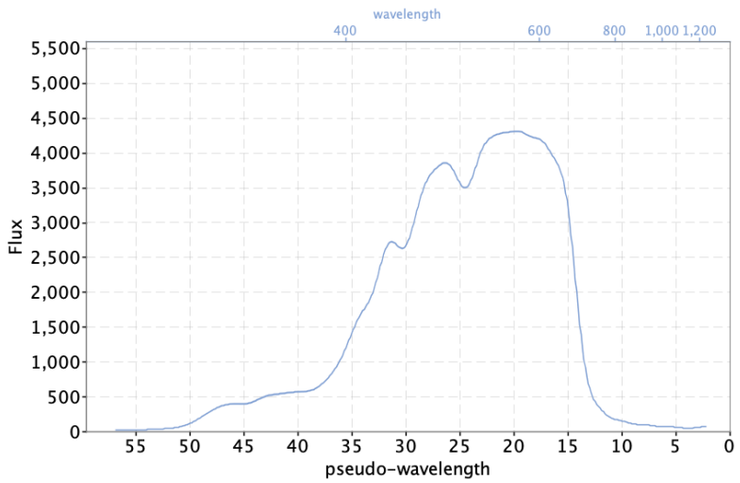
upcoming
IMAGE OF THE WEEK

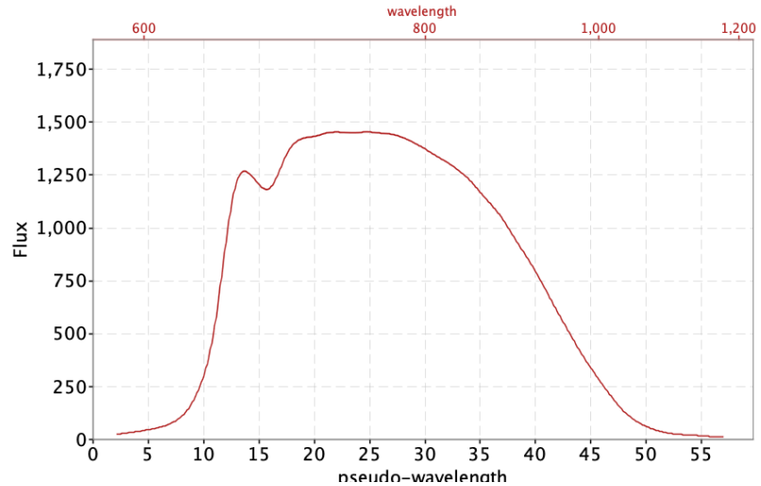




DR3: Mean BP/RP spectra

Internally-calibrated spectra

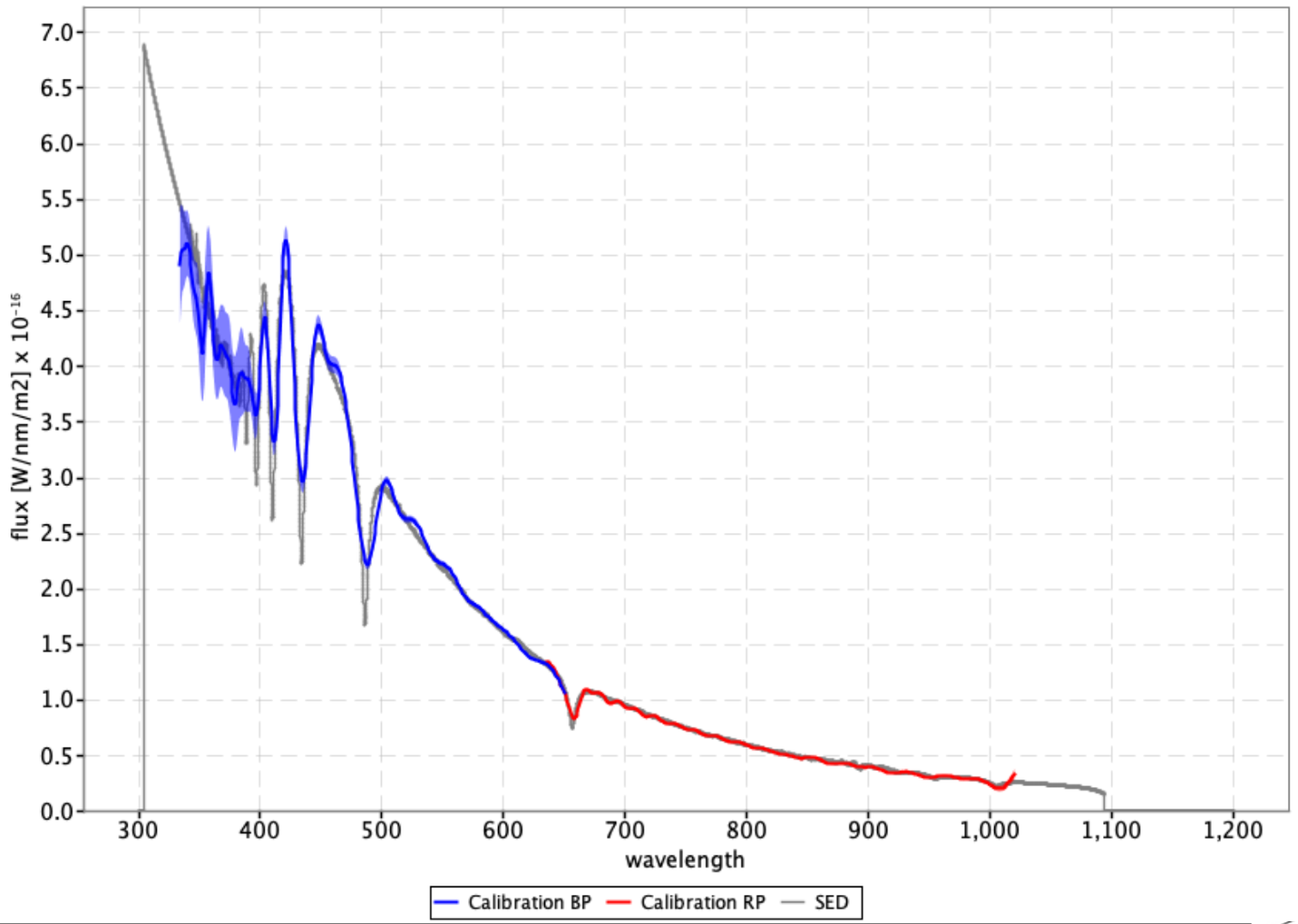




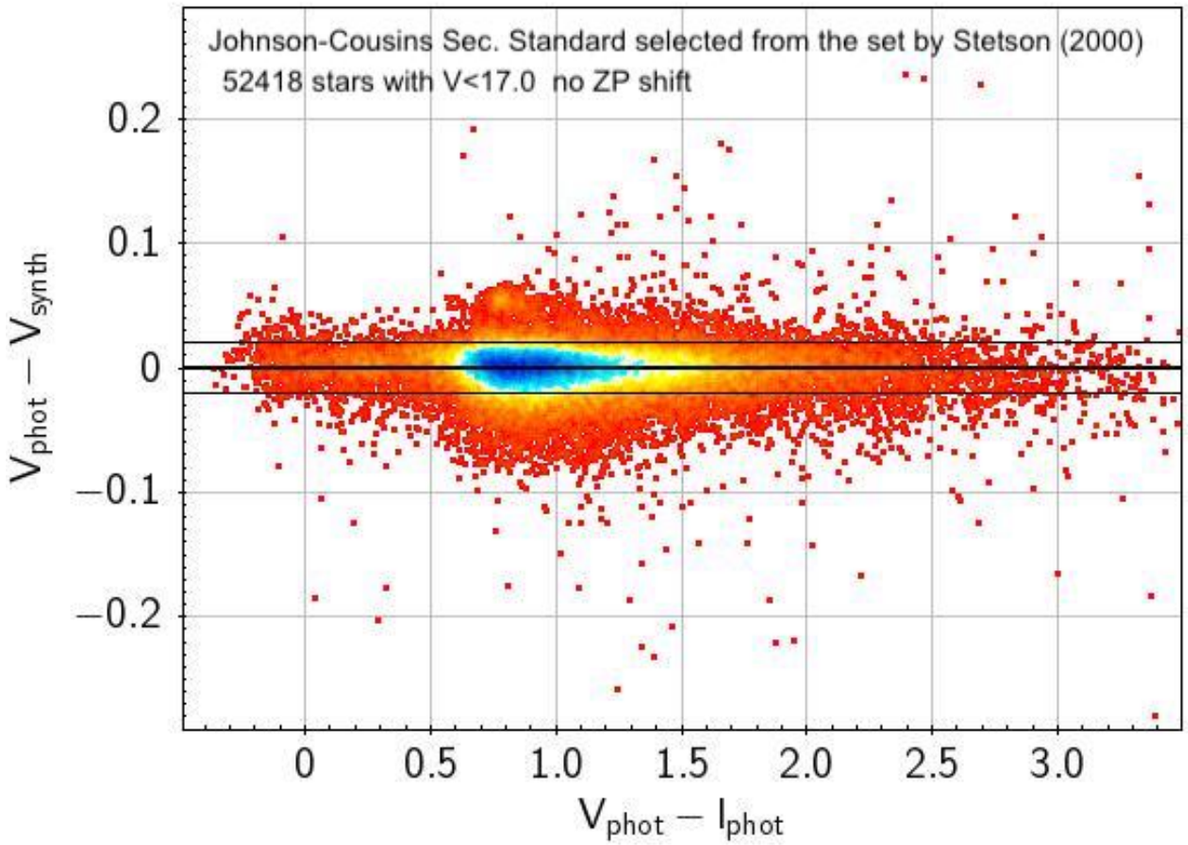
External instrument calibration

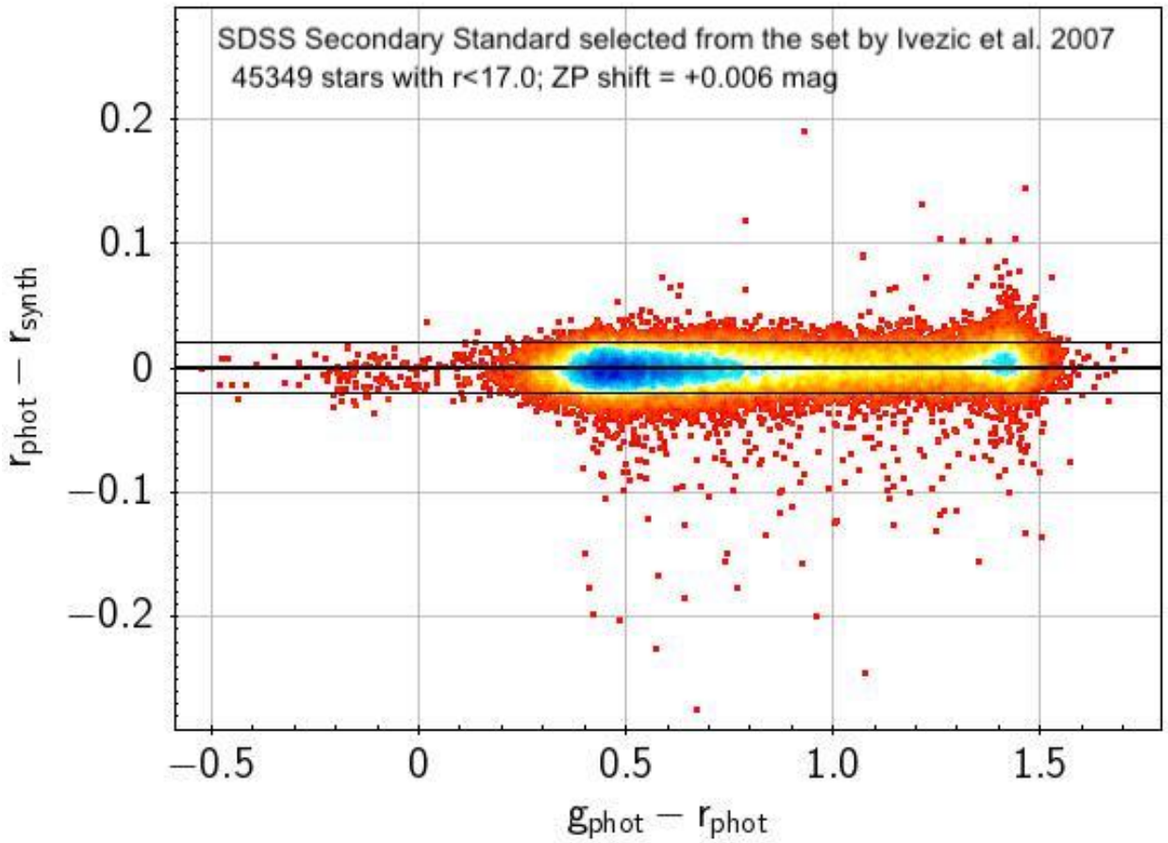
Externally-calibrated absolute spectra

Simulating Gaia internally calibrated spectra for a given SED will also be possible based on the same external calibration model.



DR3: Synthetic photometry





While we obviously encourage users to take advantage of the full information contained in the spectra, synthetic photometry in bands in the range 330-1100 nm can be generated for quick investigations or specific use cases.

A Python package is being developed to facilitate the usage of BP and RP spectra in various scenarios.

DR3: Asteroid reflectances

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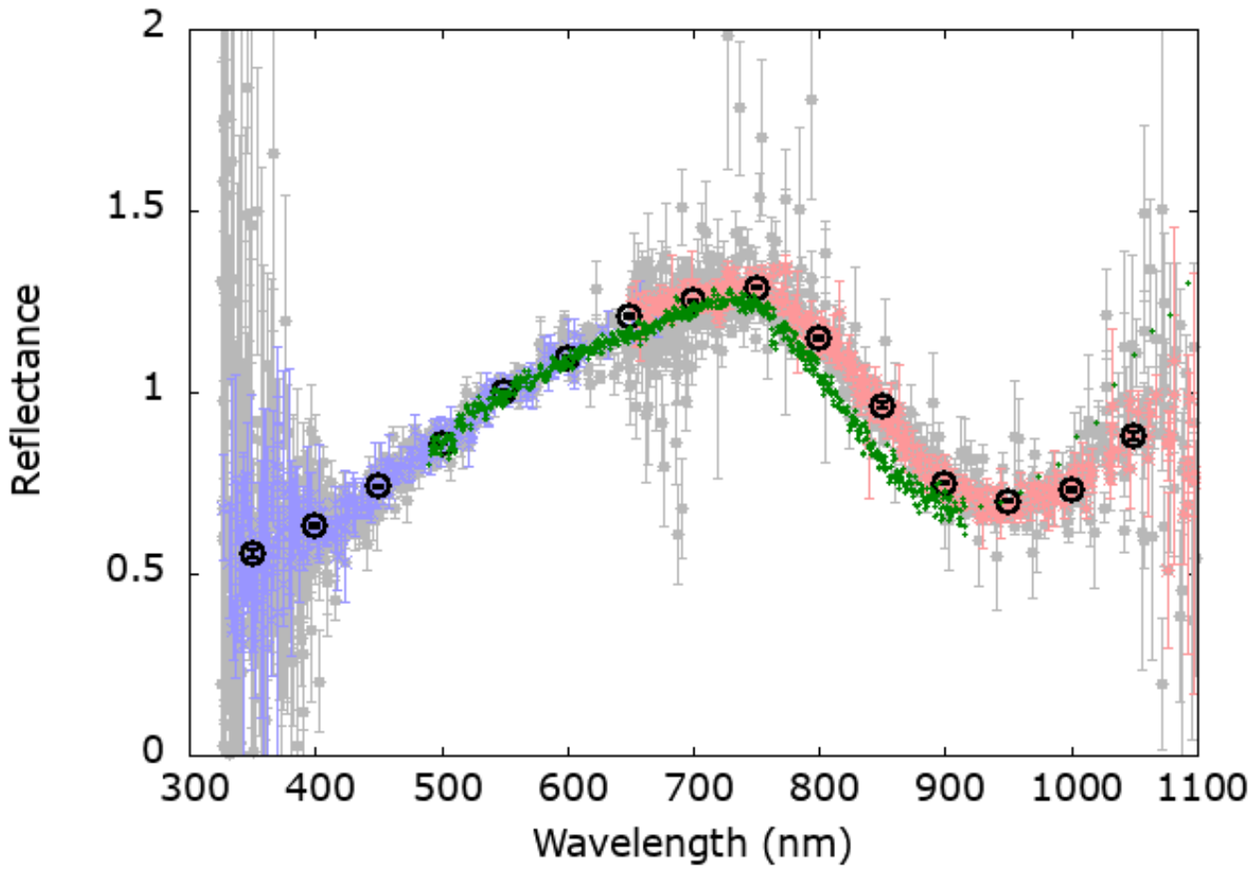

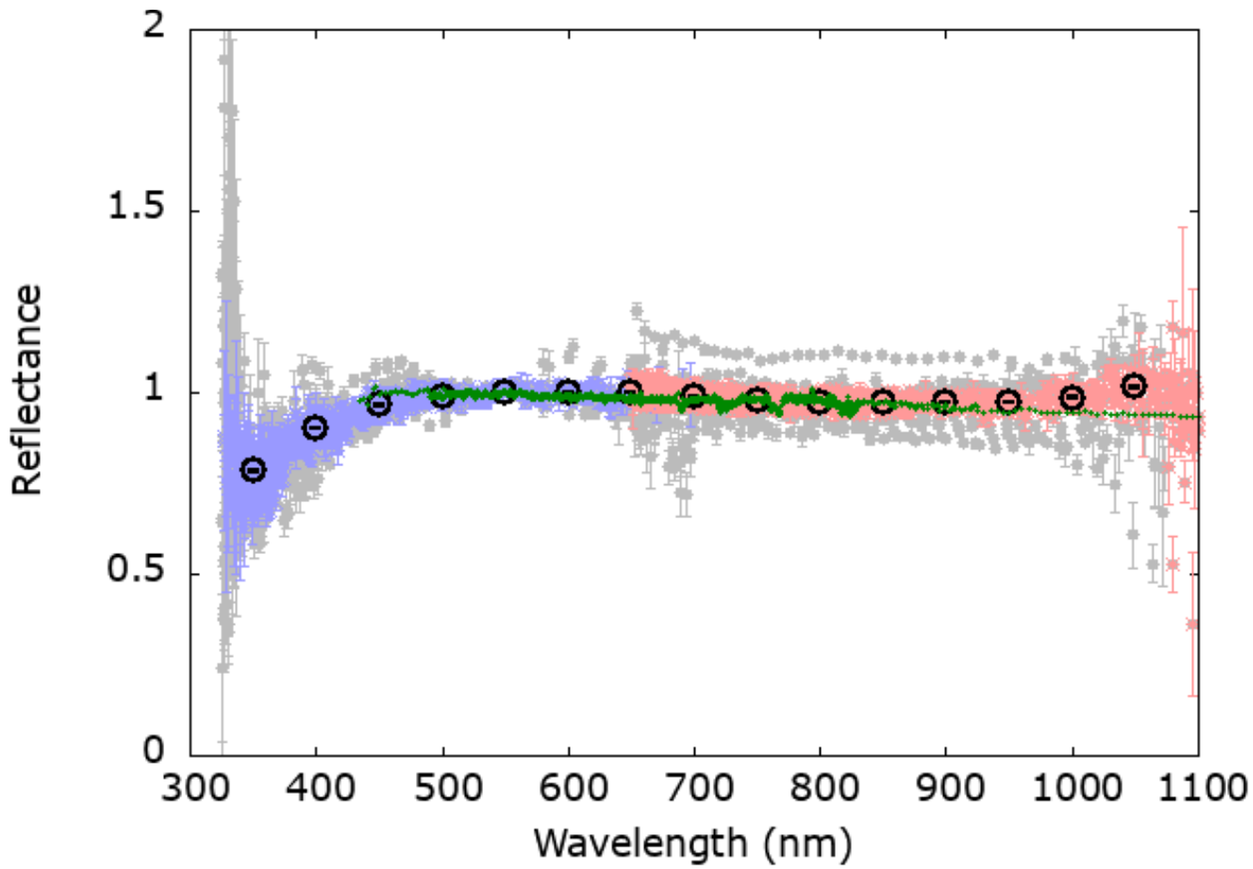

Gaia DR3 will include **reflectances** for several thousand asteroids computed from BP/RP epoch spectra. This will be a unique catalogue for its homogeneity and size.

The Gaia reflectances will extend the wavelength coverage in the range 350-500nm which is important to understand the chemical composition of these objects and is not covered by ground-based data.