Gaia Challenges: Toward mmag photometry

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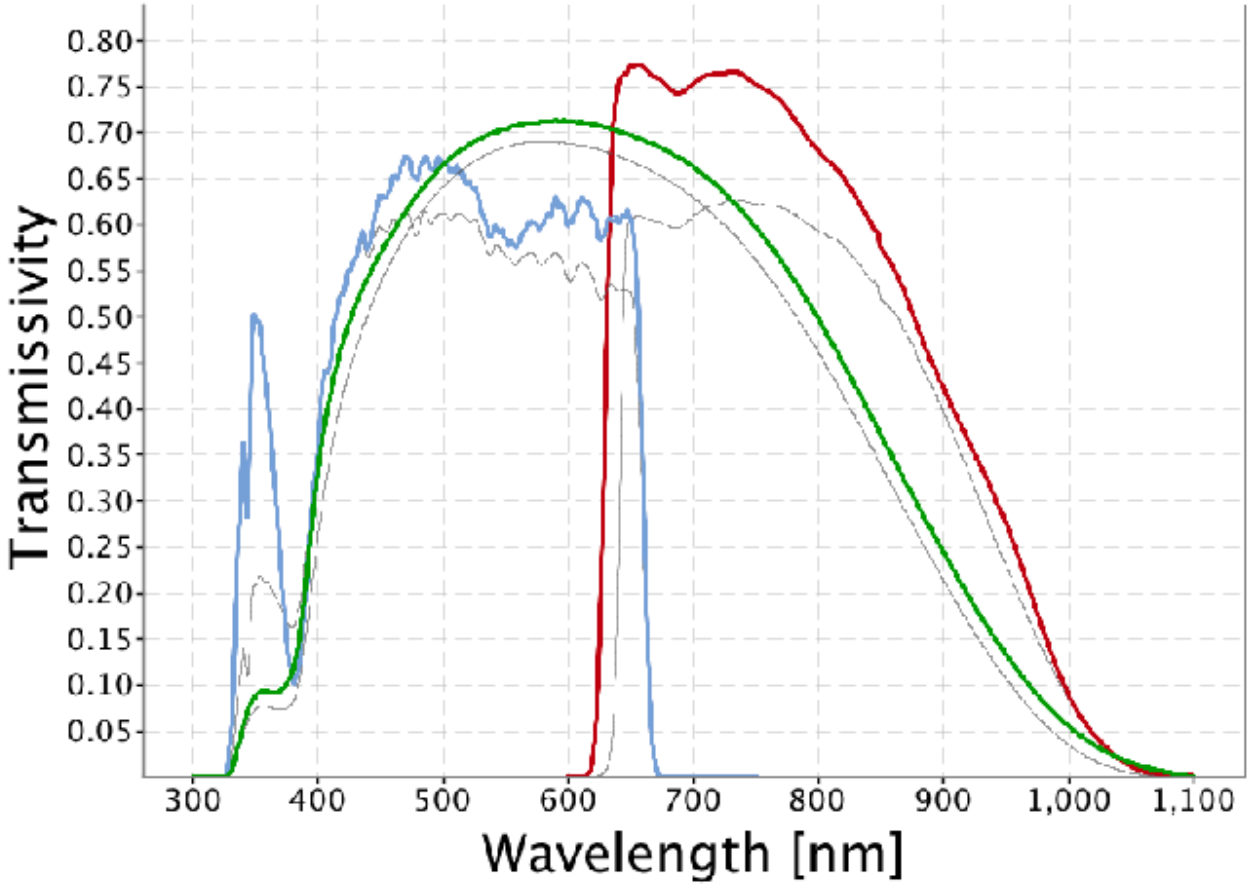
Excerpts from Gaia session DESC meeting at CMU, July 2018

Gaia Spectrophotometry

- What methods will we use to verify/validate/correct Gaia spectrophotometric information, including both griz and u and y bands for cross calibration?
- Is the u-band bump real?



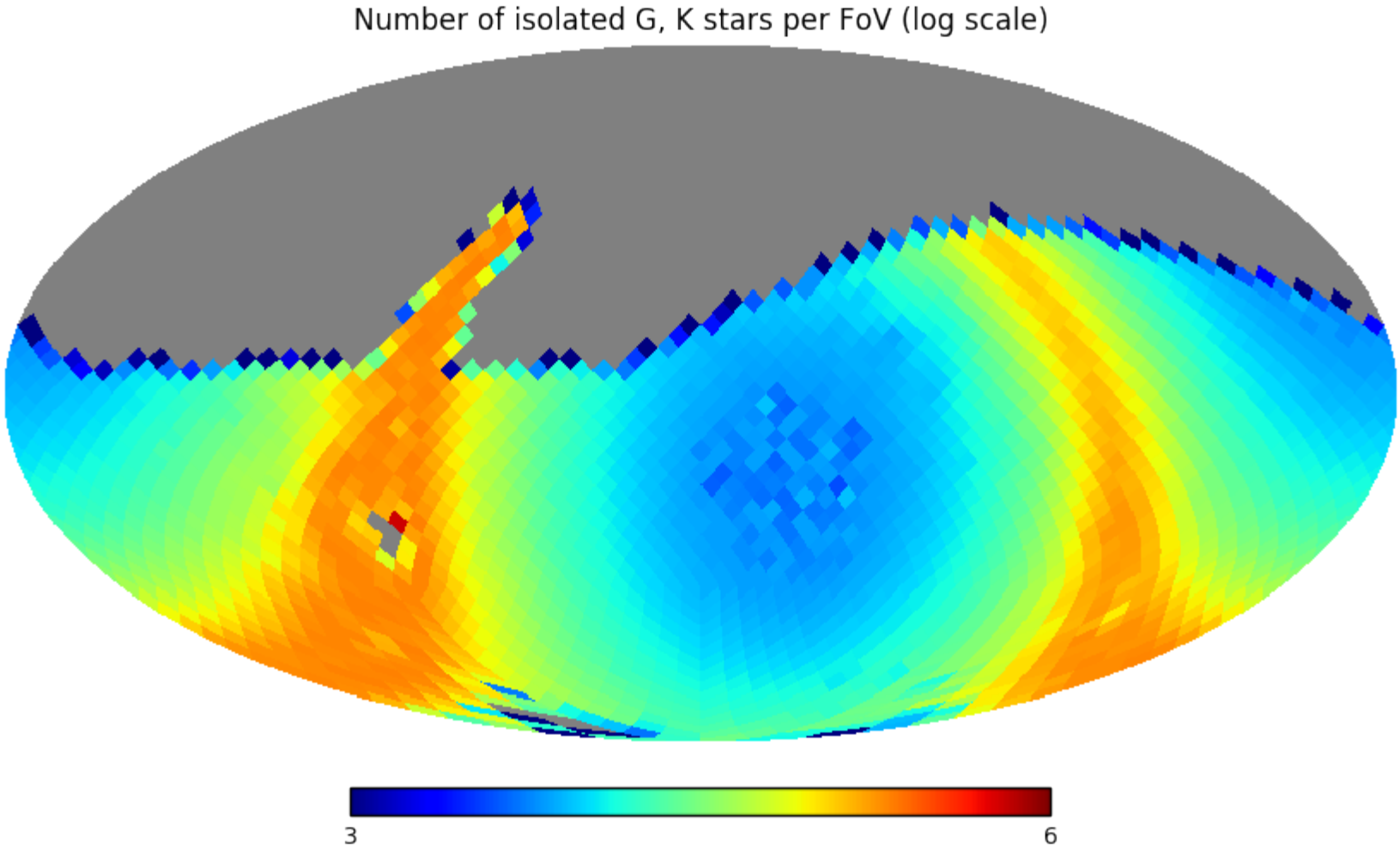
Reddening

- What can Gaia tell us about extinction at high Galactic latitude?
    - How much will Gaia people be working on this, and will it be done a way that is suitable for LSST?
- We can reject stars close to Galactic plane (in the dust)
- We need to work with Gaia people **Discussion started**

LSST specific observations

- Short shutter time to match Gaia dynamics e.g. on bright blue stars/red stars for u-griz-y cross calibration and LSST/Gaia cross calibration connected with StarDICE
- Varying shutter time to verify the linearity of response?
- For the Y1, a pair of visits at the south pole each night?
- The Commissioning team will listen to us!

=> we need to come up with procedures and an estimate of LSST telescope time required for "non-standard" observations like these



~3000 stars per FoV => ~ 15 per CCD

Measure Galactic reddening

- to measure (and correct for) the dust reddening

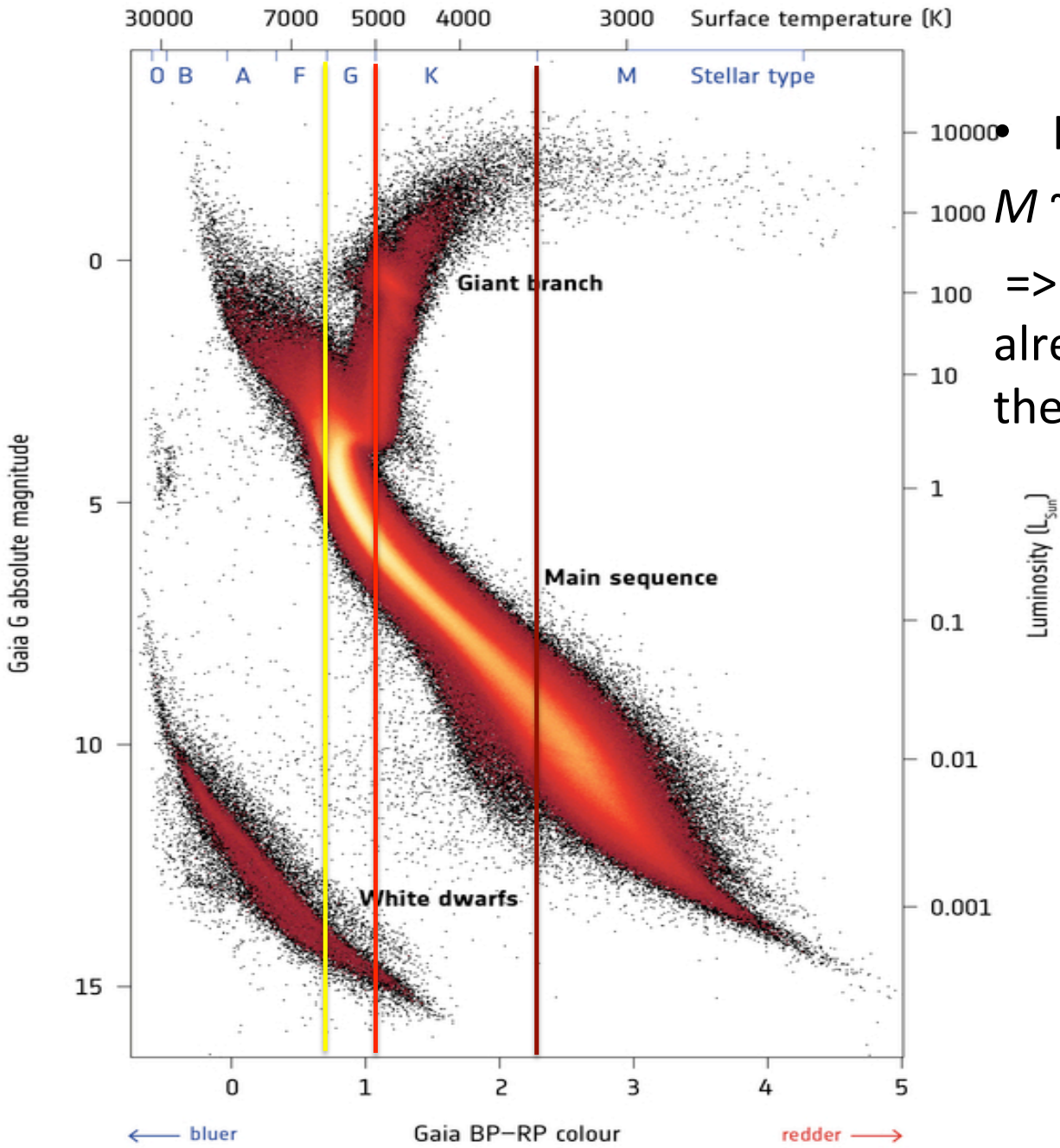
=> ideally move a beacon :

from near us to away from the Galactic disc

- GAIA spectro-photometry will be stable
- ratio of spectra will be reliable

=> use set of stars with same spectral type

- similarly (!) make ratio of spectra of same type stars

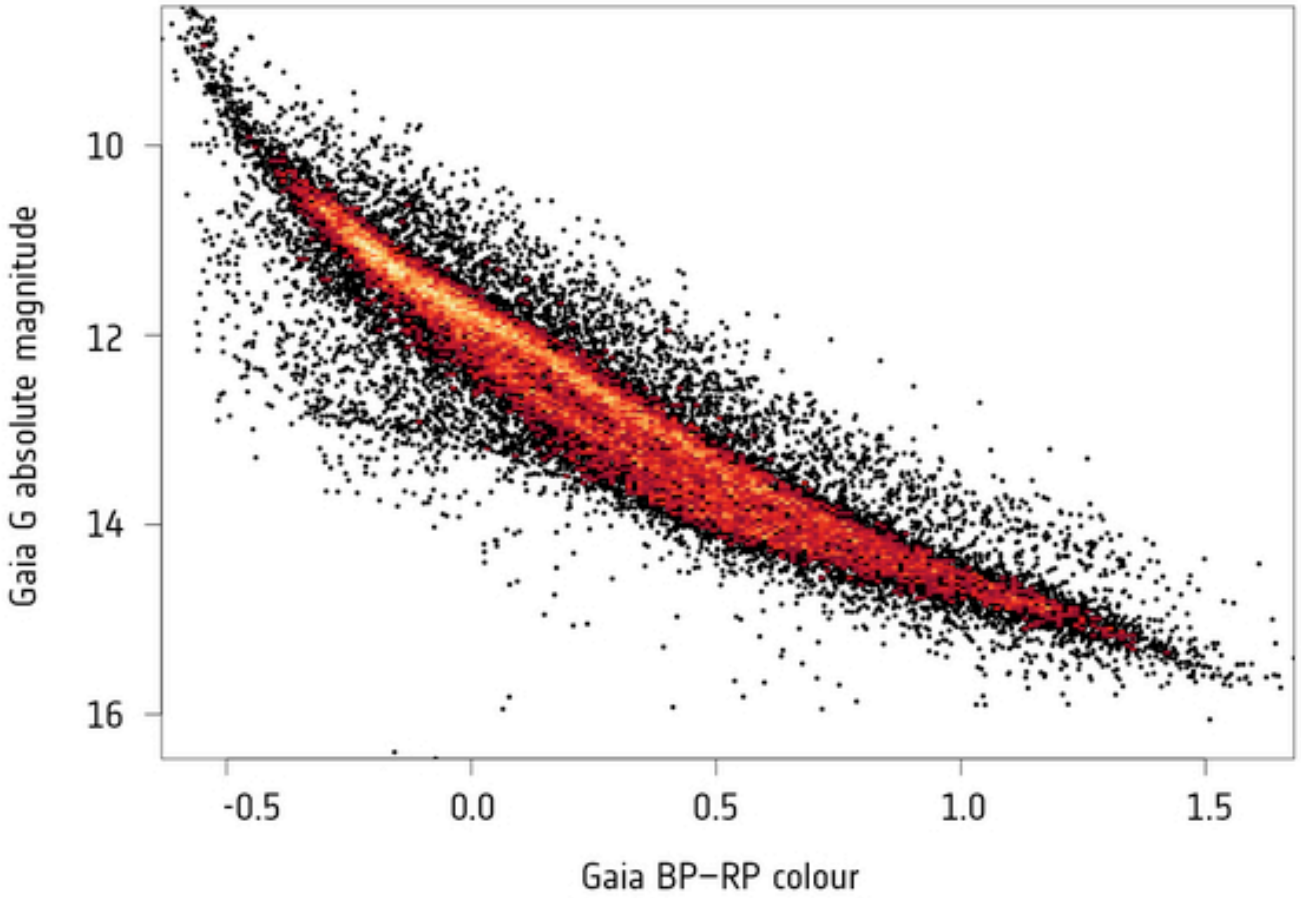


- K dwarf

$M \sim 10$

=> m = 15 at 100 pc, already away from the disc

- GAIA DR2: ~ 25 000 White Dwarves ~ ½ with $M \geq 12$ => $m = 14.5$ at 30 pc => 2 s exposure at most



AuxTel

- What AuxTel measurements should we plan, and how can this be useful for our Gaia comparisons?
    - Calibration star selection and measurement: CALSPEC, G&K stars, anything else?

connected with StarDICE

    - PSF shape variation (central part + wings) under different atmospheric conditions, etc.

=> we need the help of stellar physics specialists and to come up with an observation plan and an estimate of AuxTel time