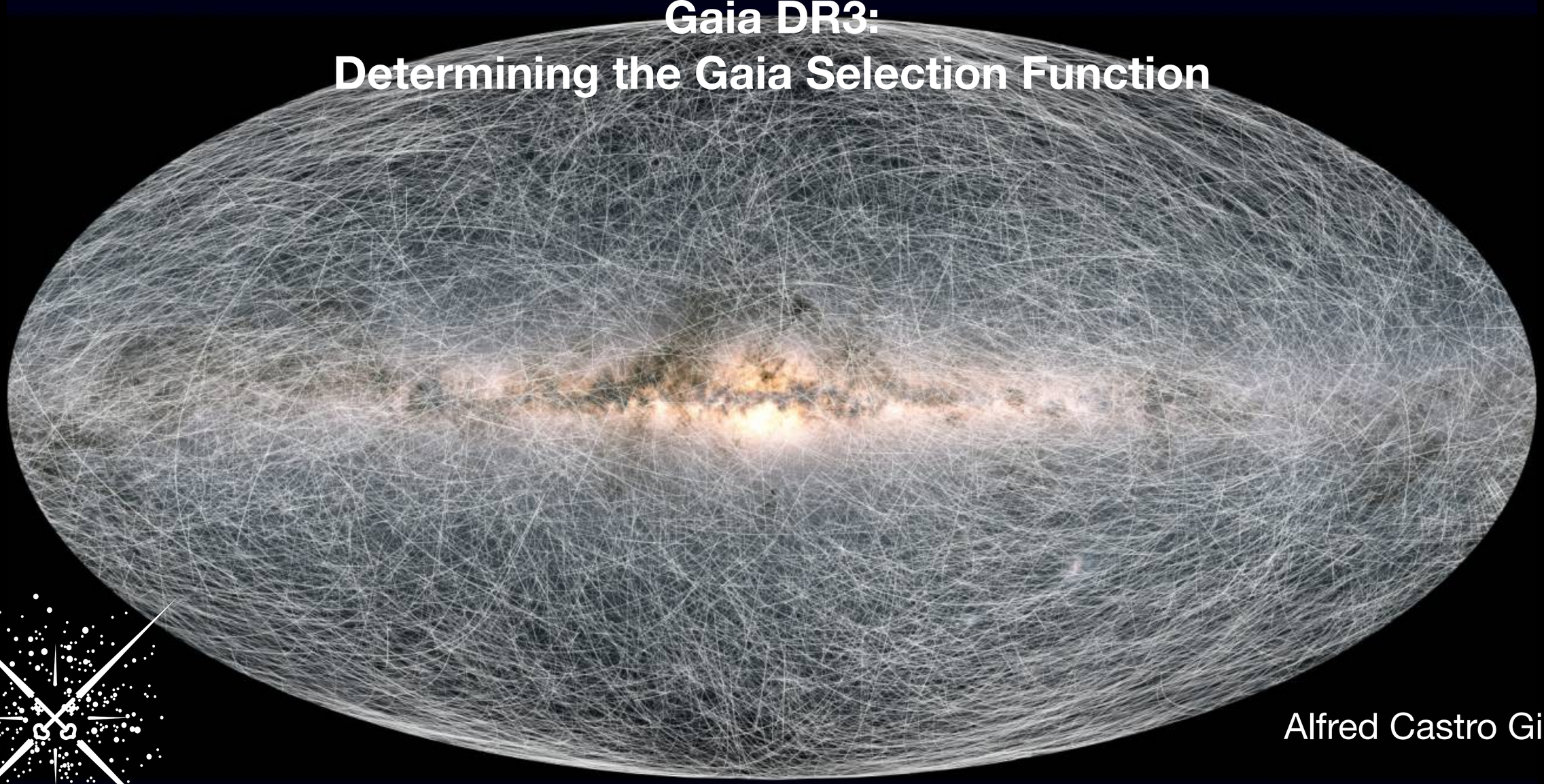
Gaia DR3:
Determining the Gaia Selection Function



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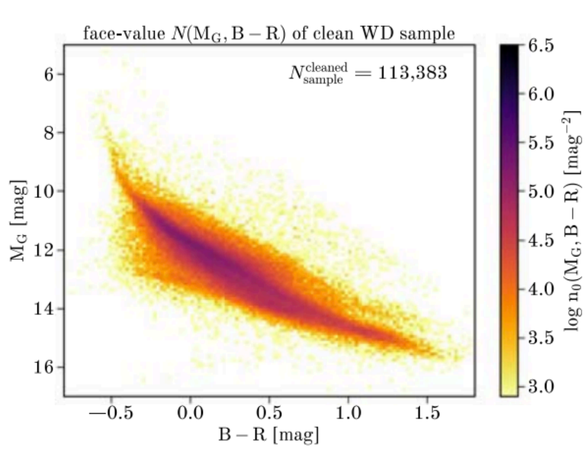
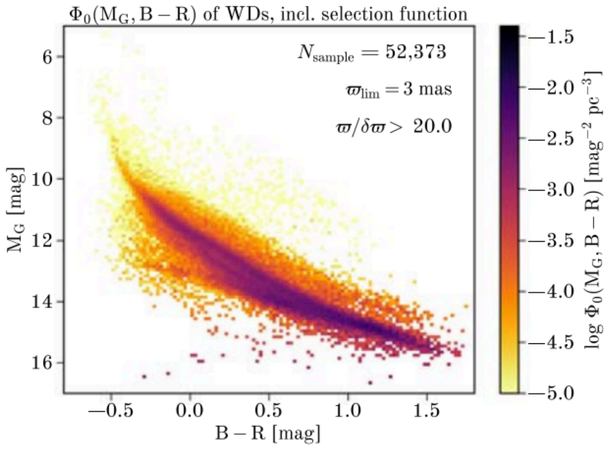
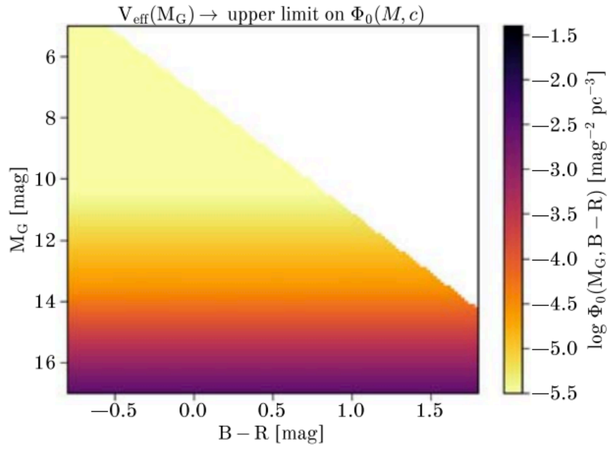
Gaia Selection Function: motivation

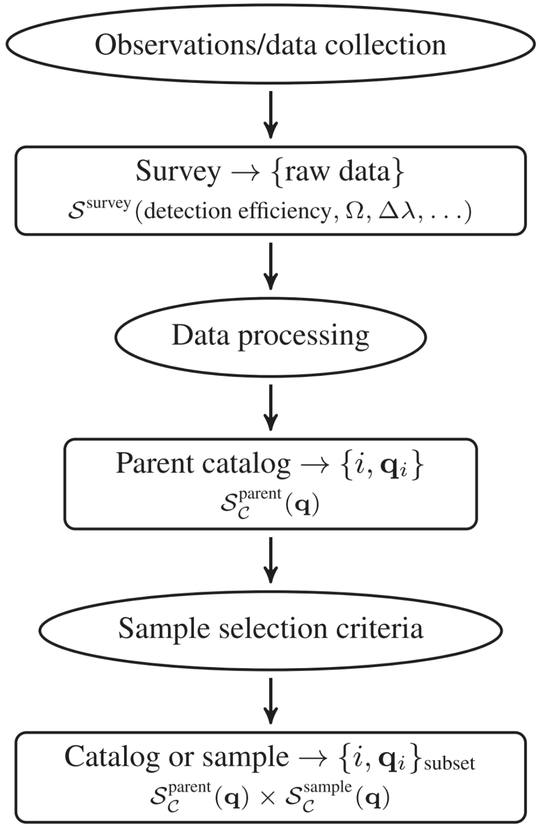
To reach reliable scientific conclusions when working with Gaia data, we need to account for the processes in which stars make it or not into the Gaia catalogue.

Space density of white dwarfs as a function of magnitude and color: [Rix+21]



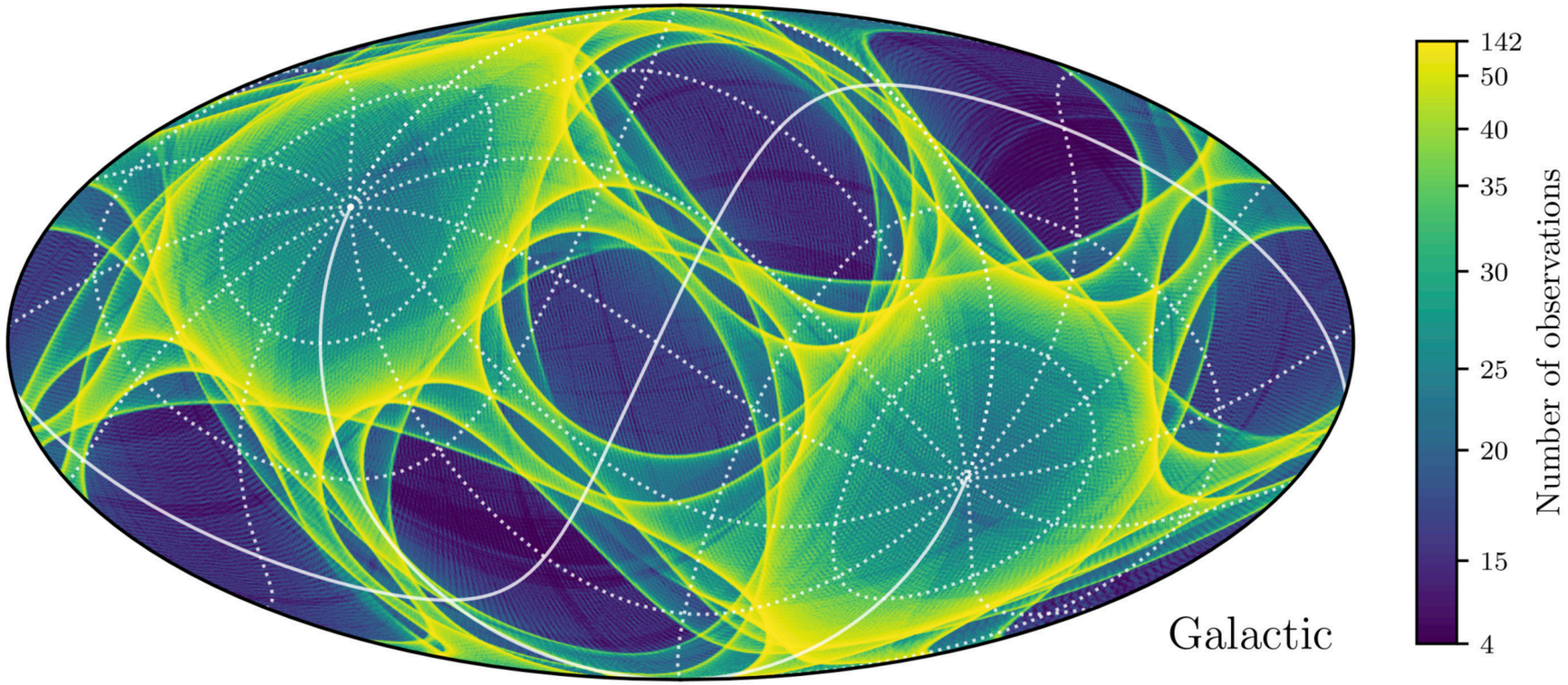






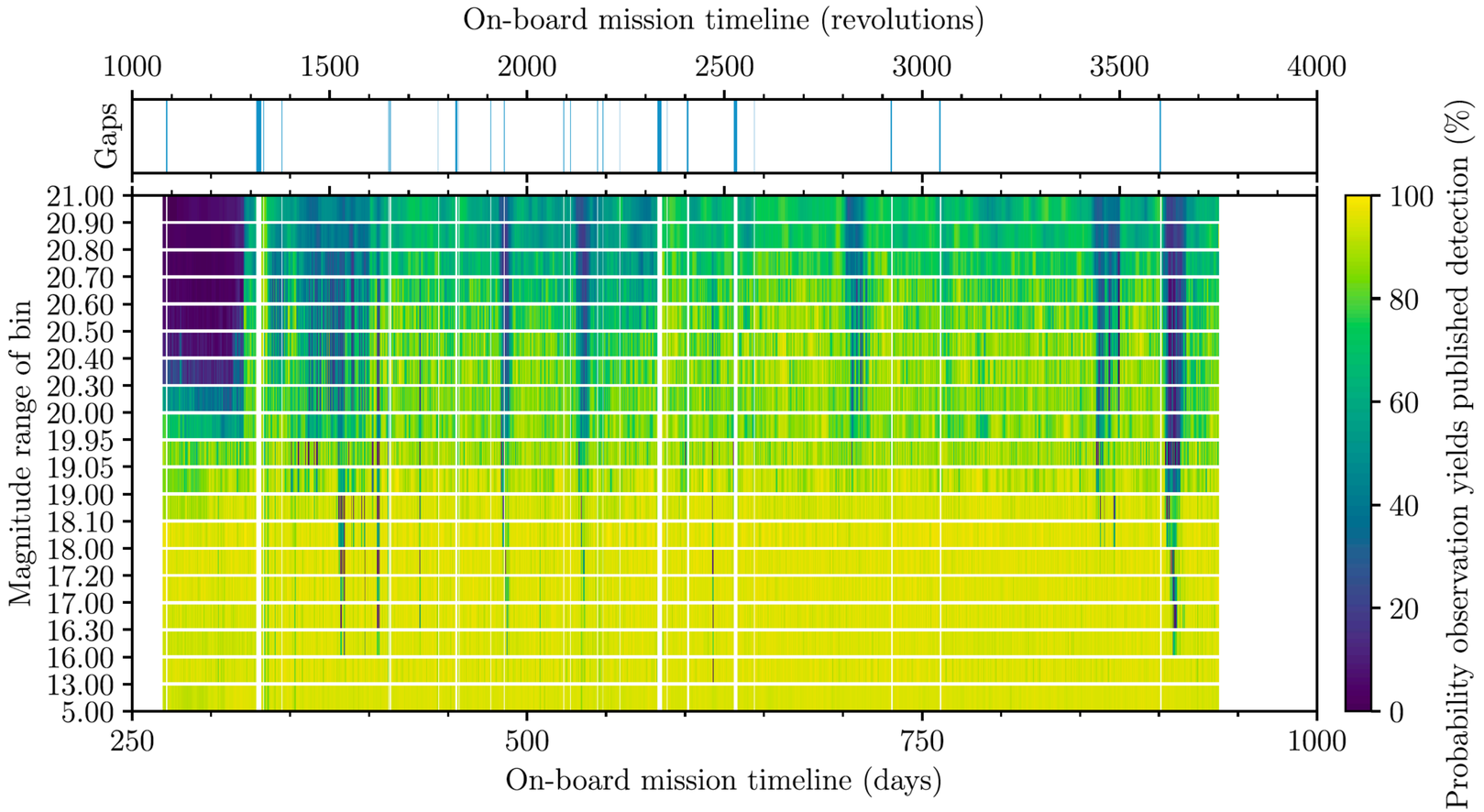
Gaia Selection Function: ingredients

Scanning Law



Gaia Selection Function: ingredients

Data taking gaps and detection efficiencies

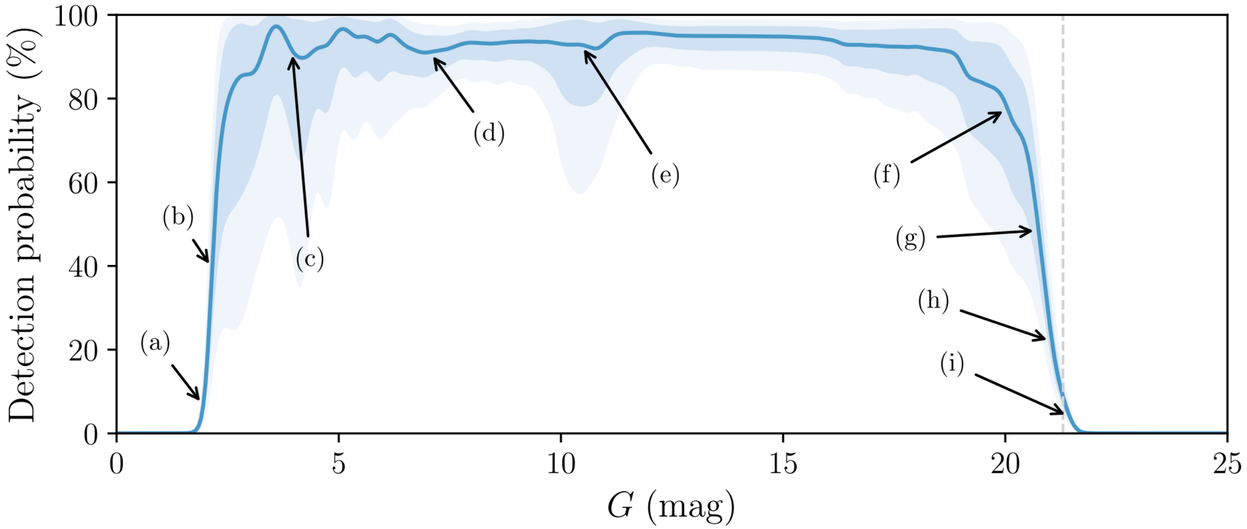


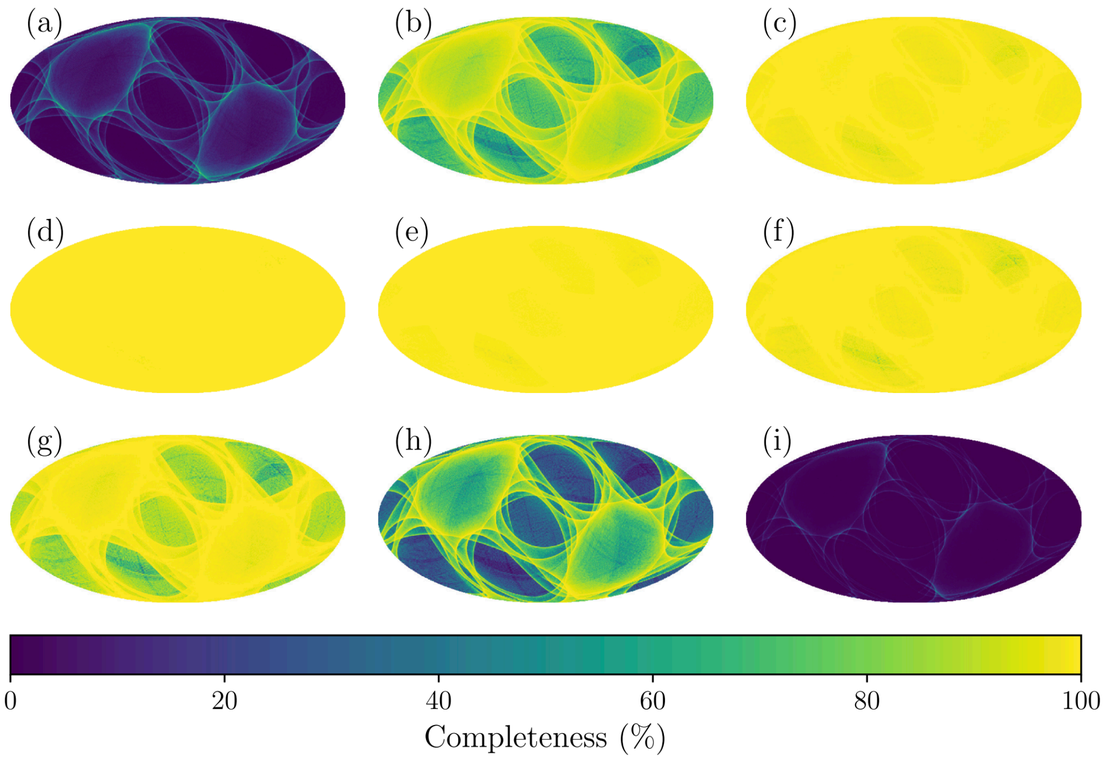
Gaia Selection Function: ingredients

Probability that a star makes it into the catalogue

A star needs to be detected (at least) 5 times to be included in the Gaia catalogue.

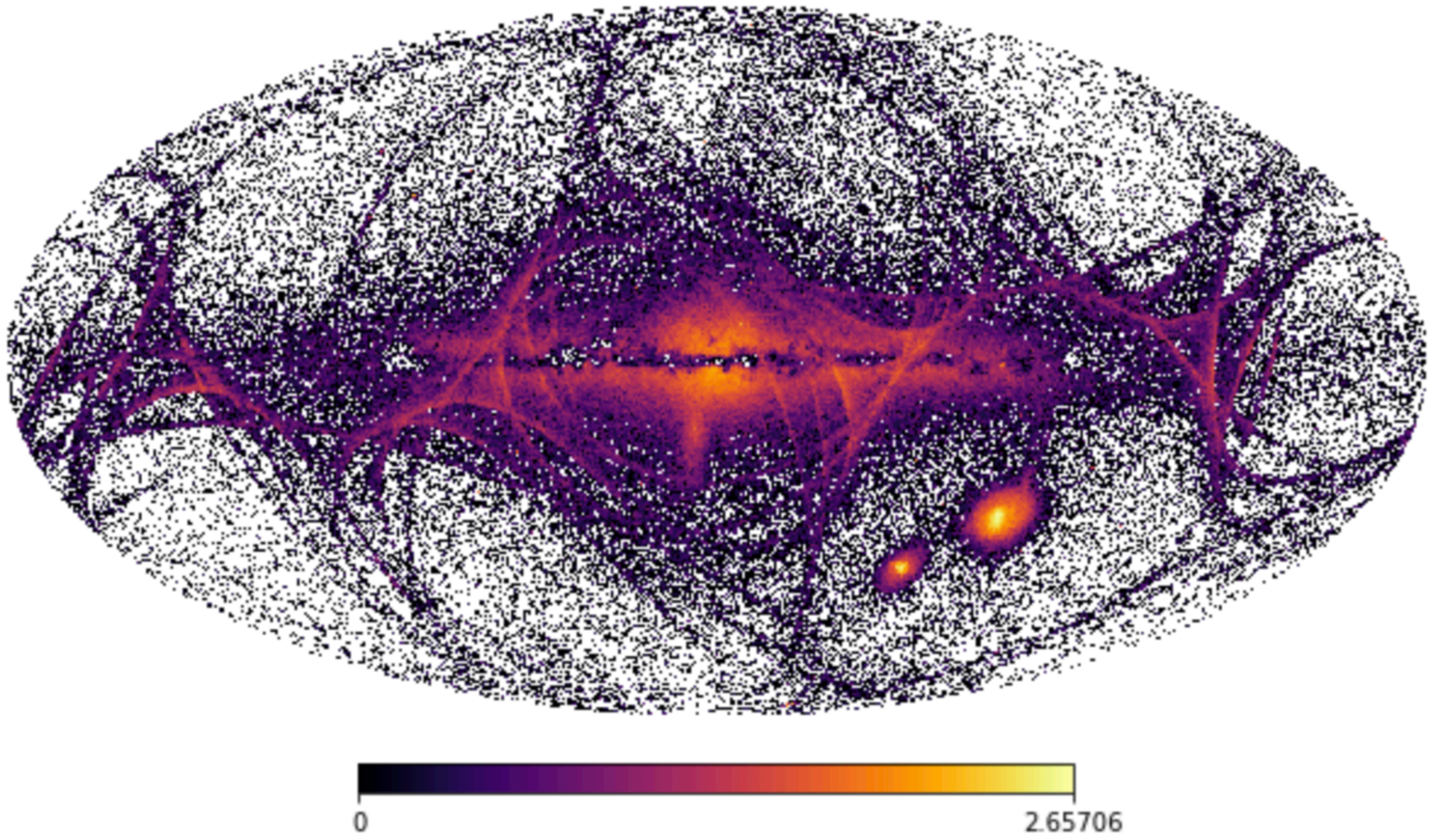
Flipping biased coins: $$\mathrm{P}(k|n,\theta) = \binom{n}{k}\theta^k(1-\theta)^{n-k}$$



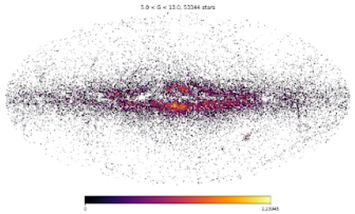


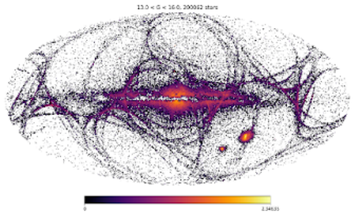
Gaia Selection Function: DR2

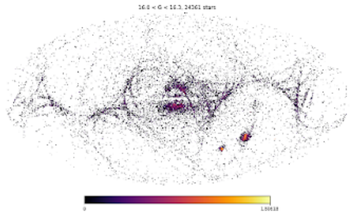
Work based on the (0.5M) variable stars with epoch data in DR2 [Boubert+20]

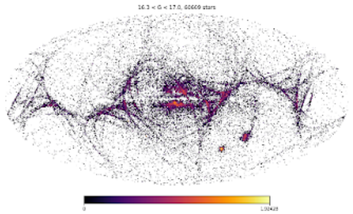


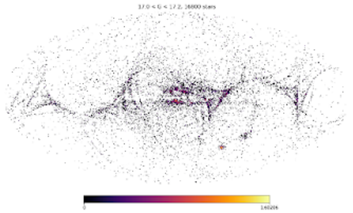
Gaia Selection Function: DR2

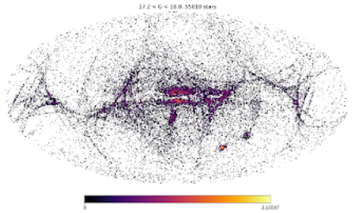


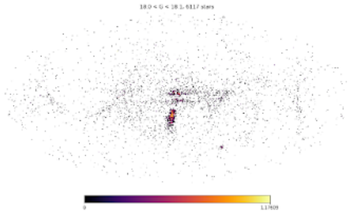


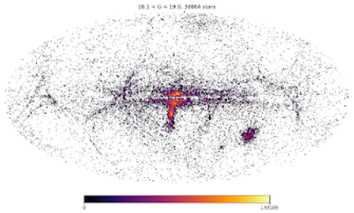


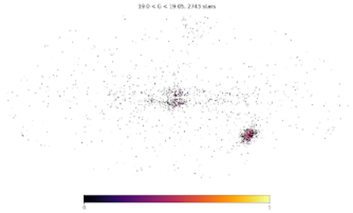


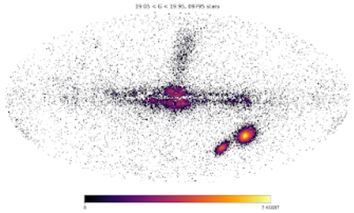


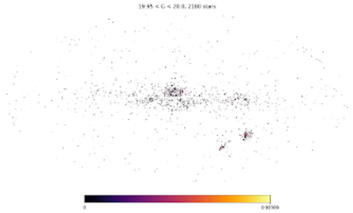


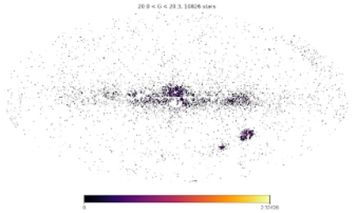


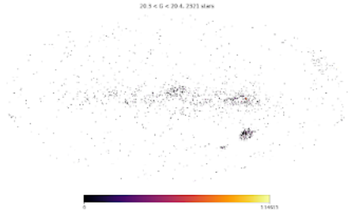


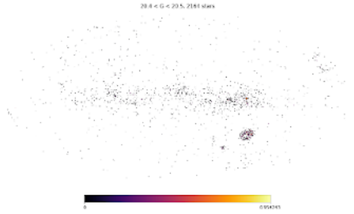


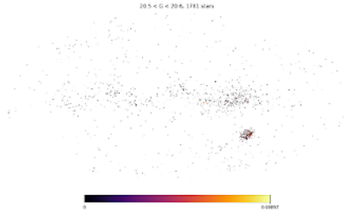


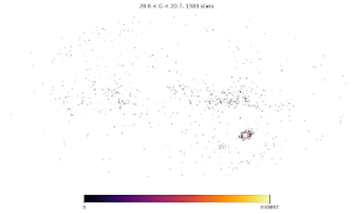


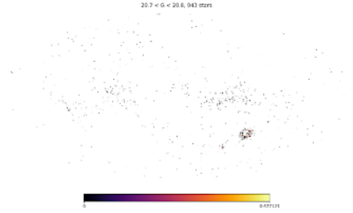


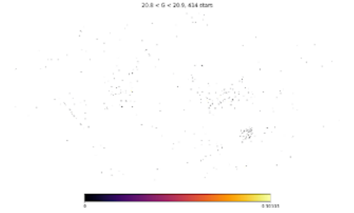


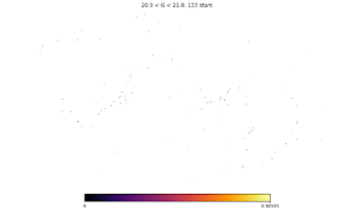










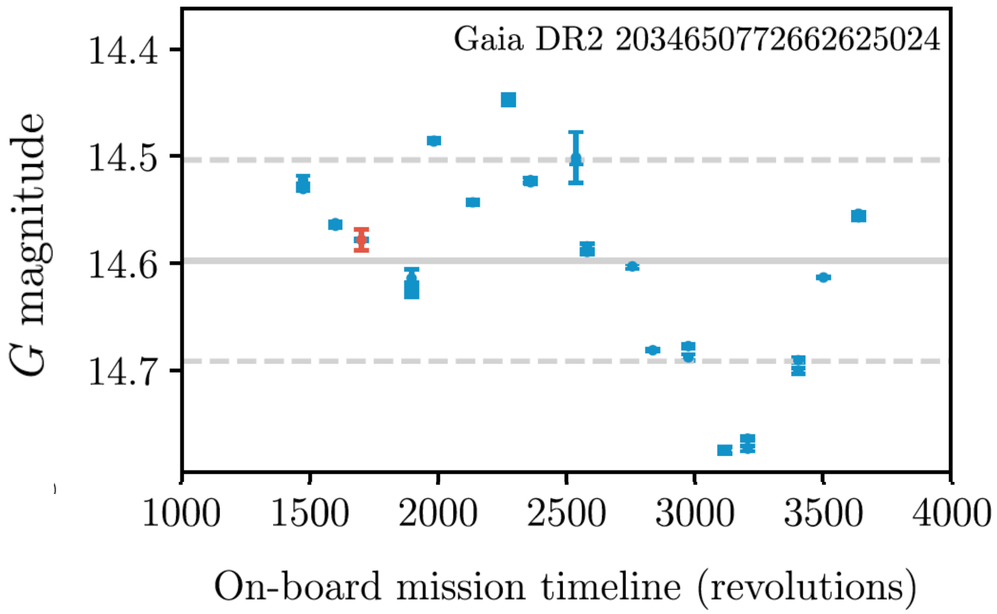


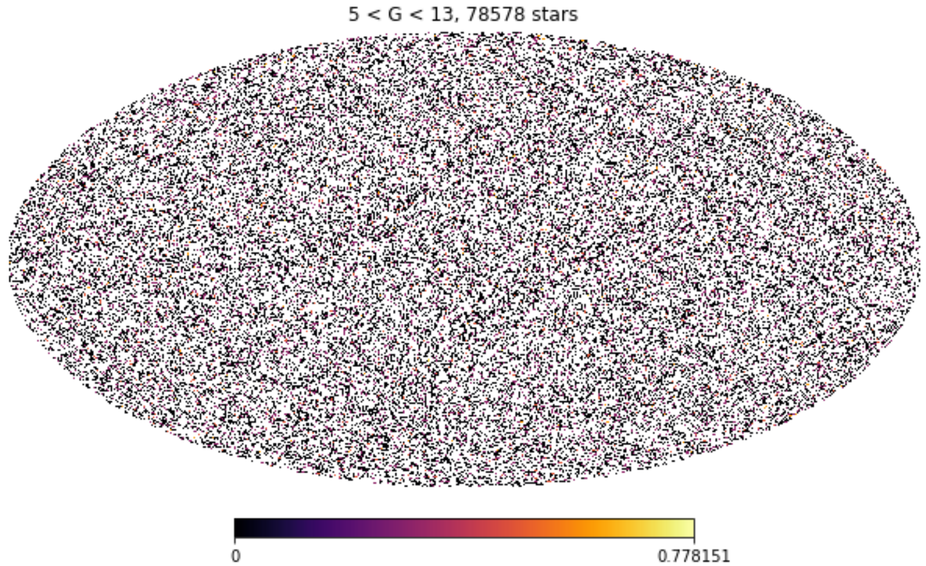
Gaia Selection Function: improvements EDR3-DR3

Improve sampling to avoid selection effects:

- Transit information for Gaia EDR3 (DPAC internal): 70kM rows, ~2 Tb in gbins.

Use non-variable stars to simplify the statistical model





Gaia Selection Function: user interface

We aim to provide python packages to query our results:

- Scanning law: https://github.com/gaiaverse/scanninglaw/blob/main/scanninglaw/examples/scanninglaw_demo.ipynb
- Selection function: https://github.com/gaiaverse/selectionfunctions/blob/main/selectionfunctions/examples/example_EDR3.ipynb