Towards an Automated Processing of Gaia Eclipsing Binaries

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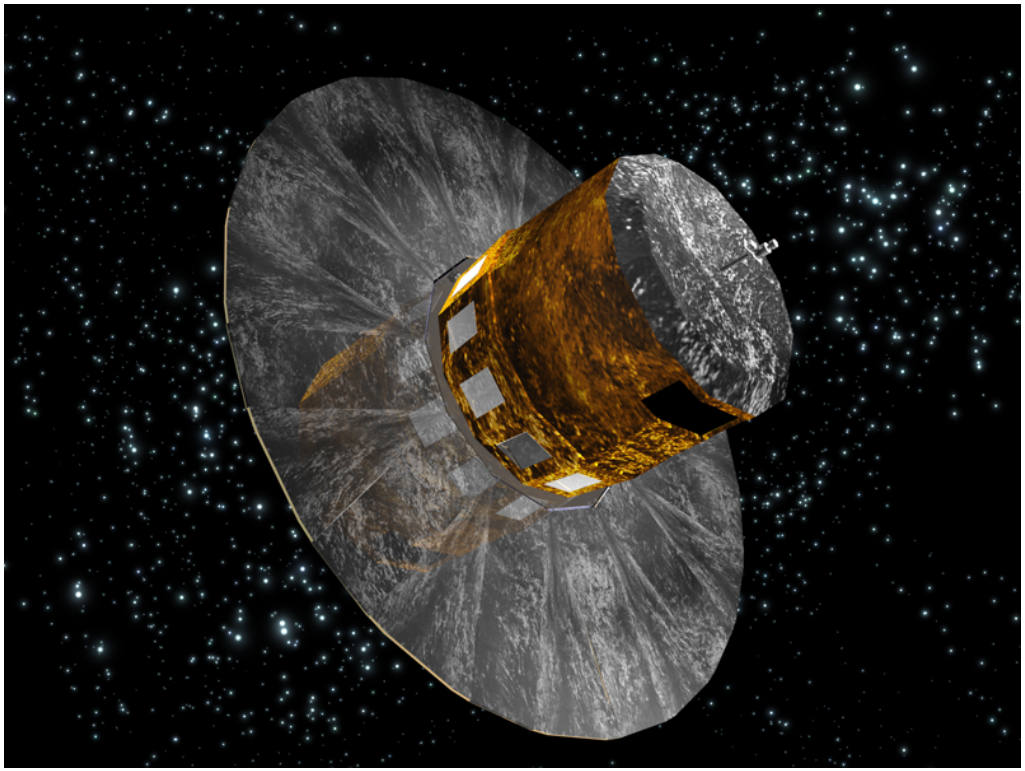
10th Hel.A.S. Conference, Ioannina, Greece

gaia

Gaia DPAC
Data Processing & Analysis Consortium

The Gaia Mission



- Gaia is an ESA Cornerstone mission
- Goal: To provide a 6D map of the Galaxy
- Gaia is a scanning mission
  - no pointing
  - no change in schedule
  - 30-200 transits per object (~80 transits on average)
- $\sim 10^9$ stars to $V = 20 - 22$
- $\sim 10^6 - 10^7$ galaxies
- $\sim 500,000$ quasars
- $\sim 3 \times 10^5$ solar system objects
- $\sim 10^4$ exoplanets

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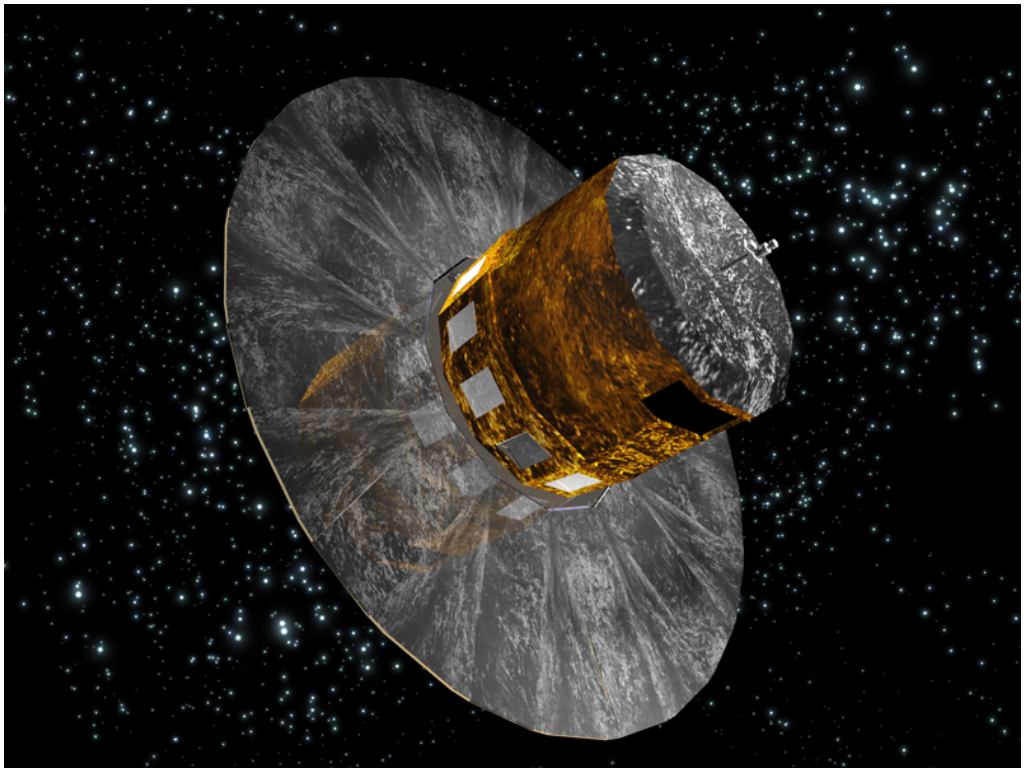

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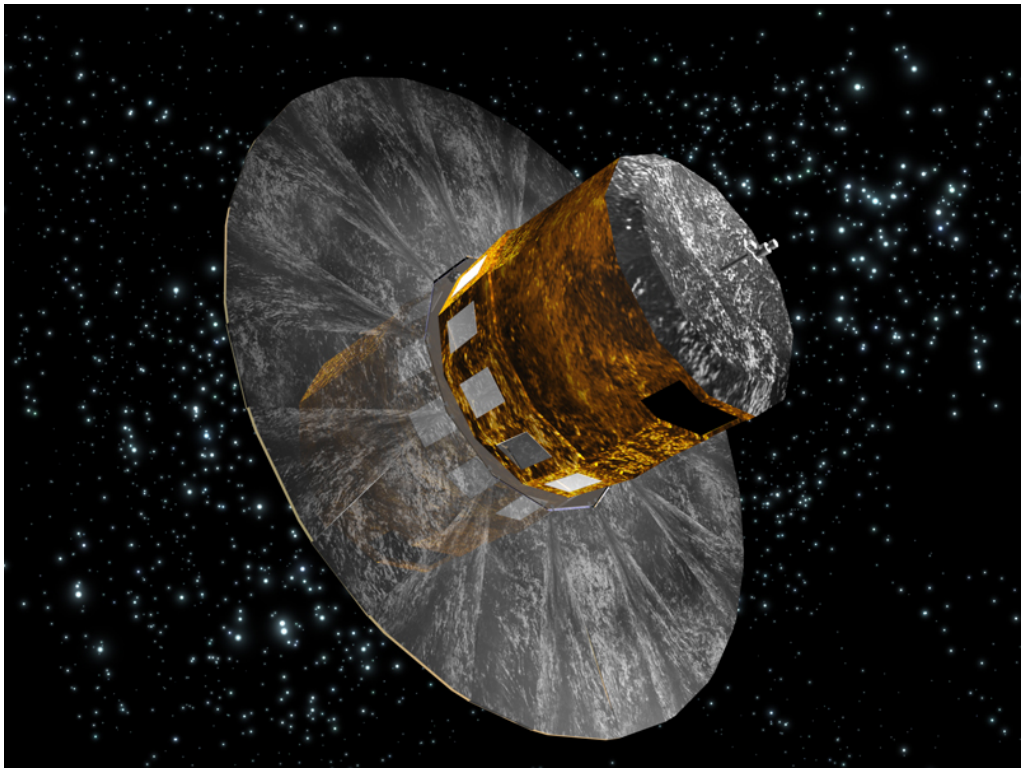

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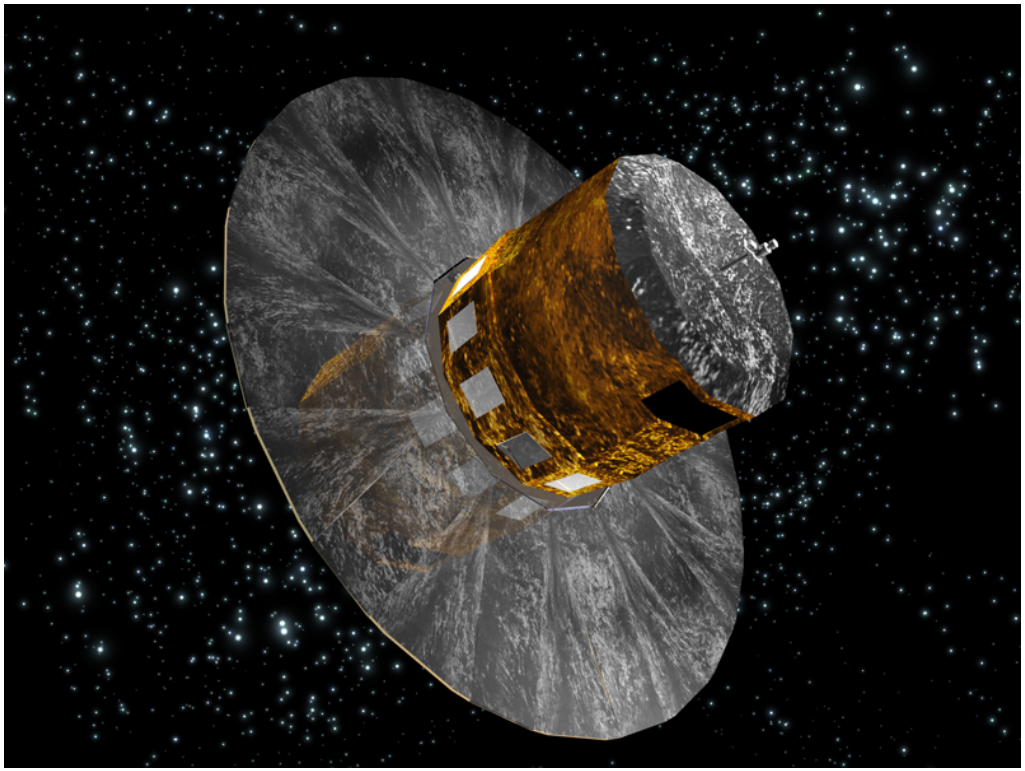

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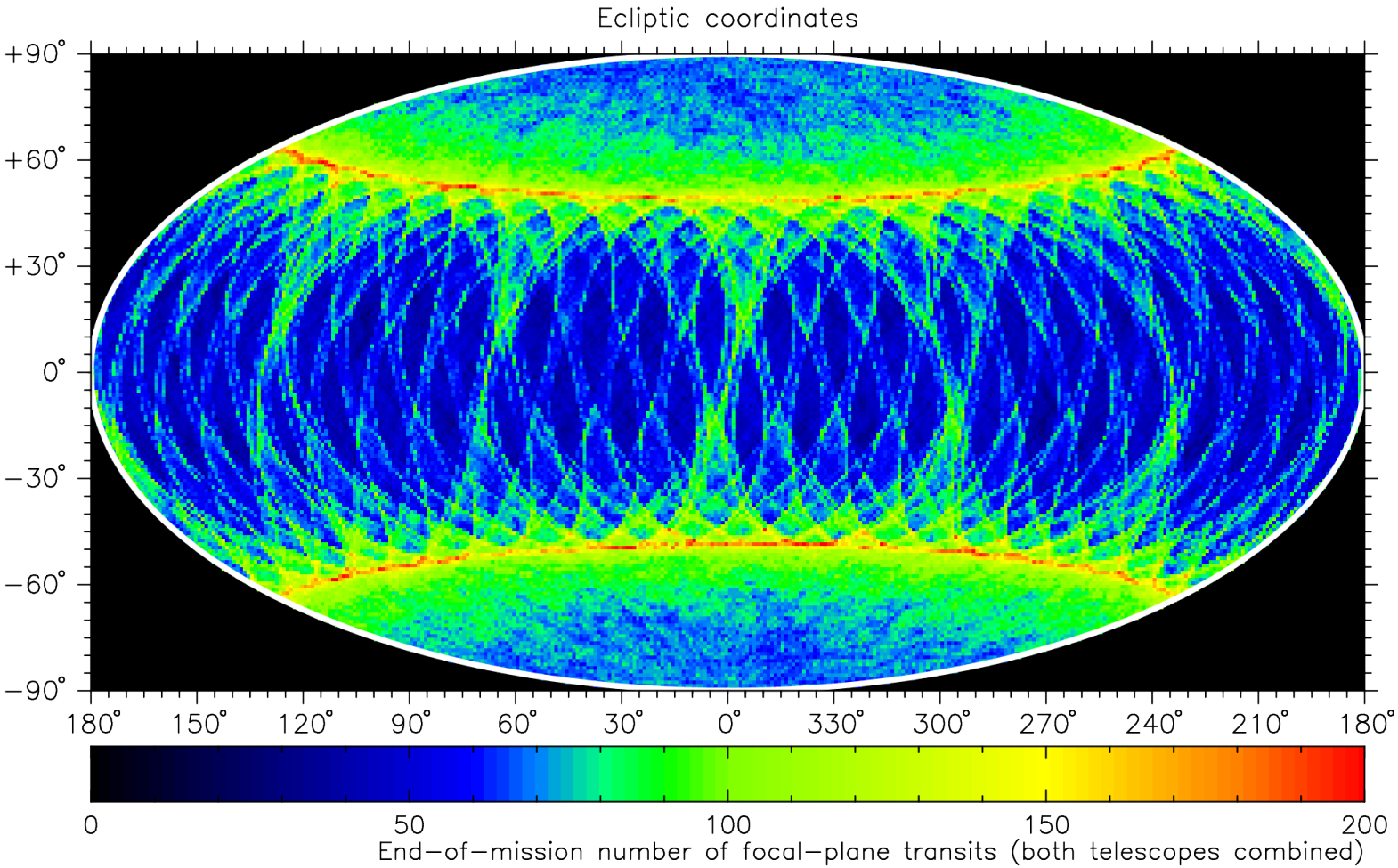
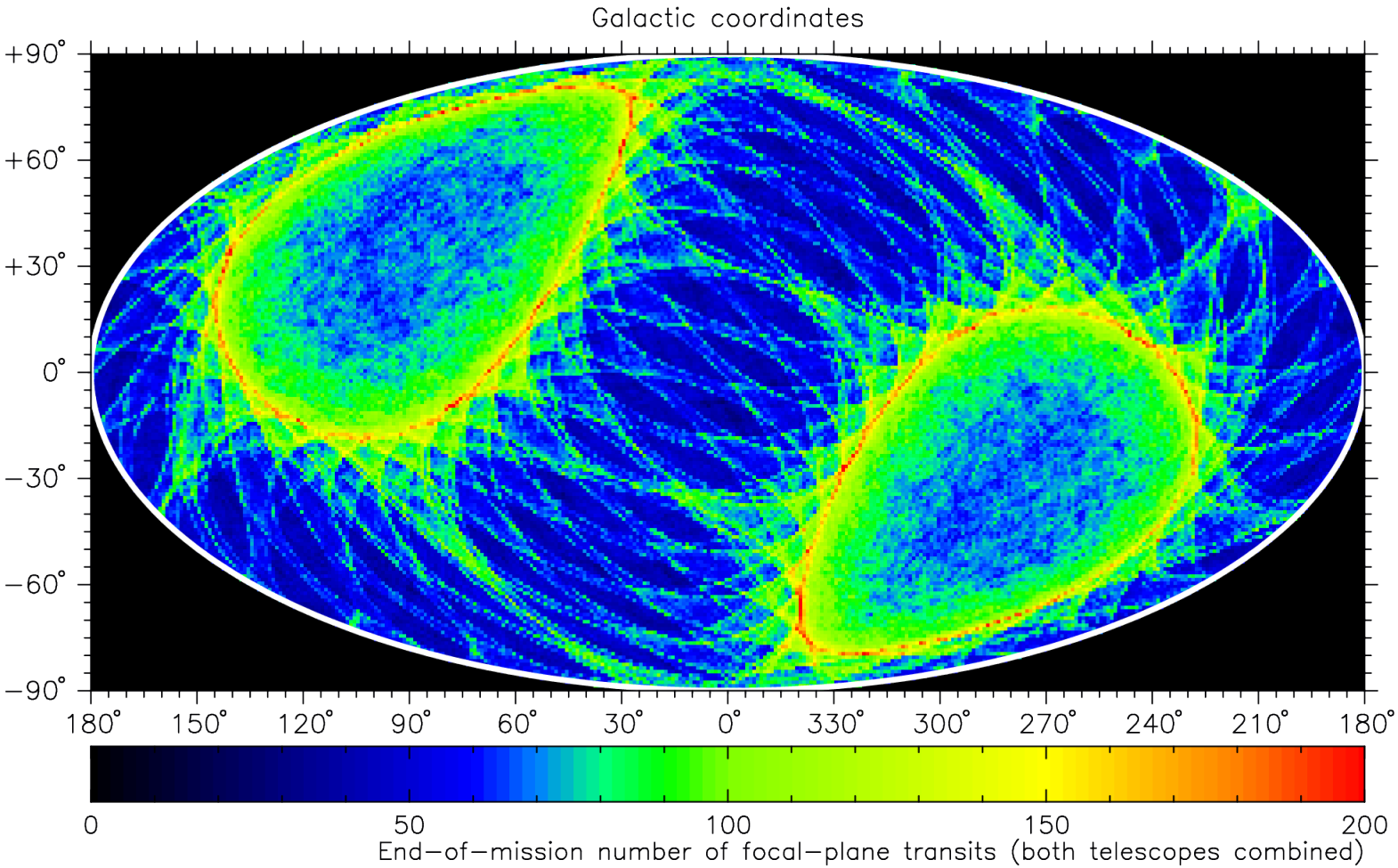
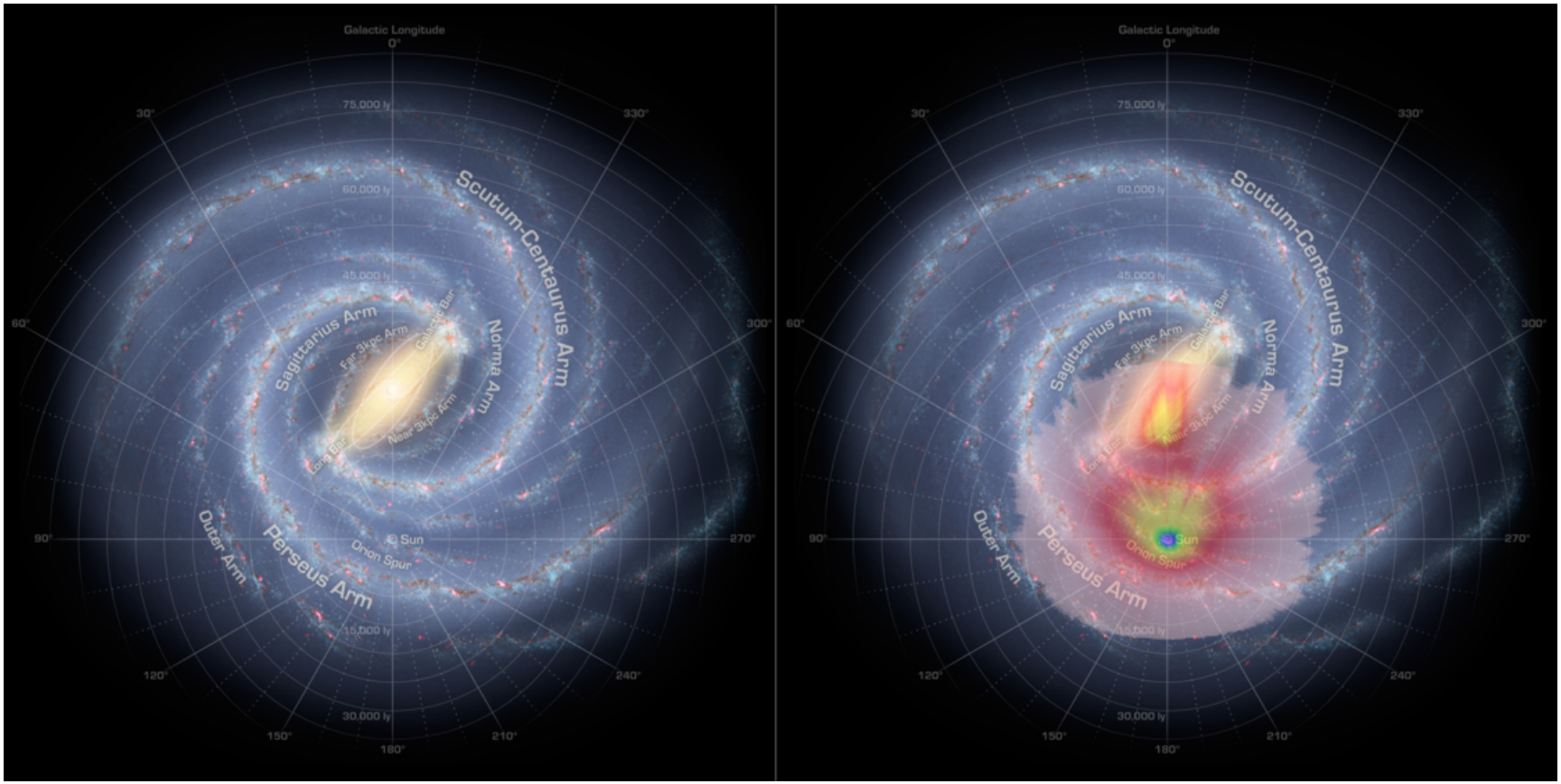


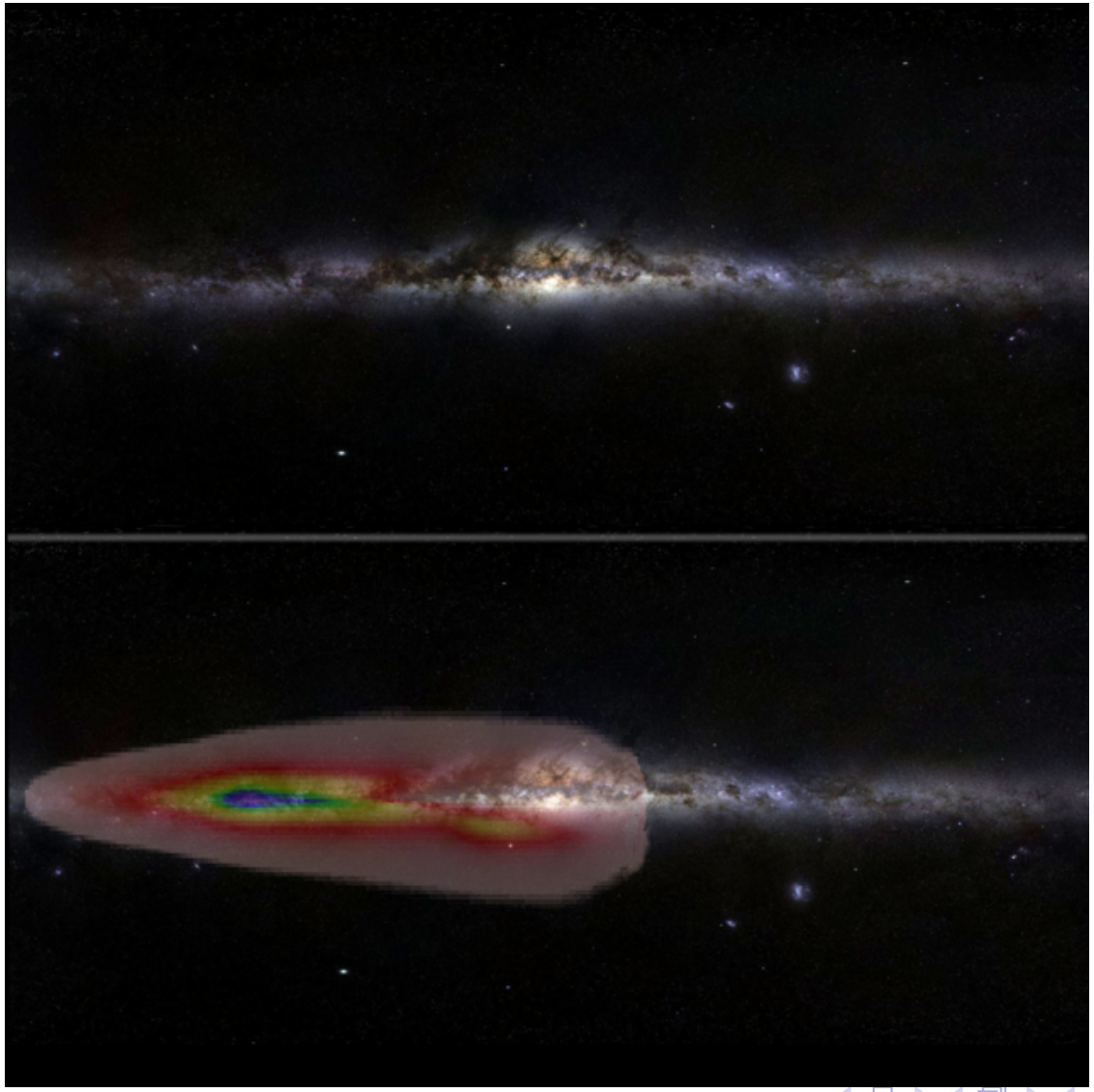
Gaia sky coverage – Galactic coordinates



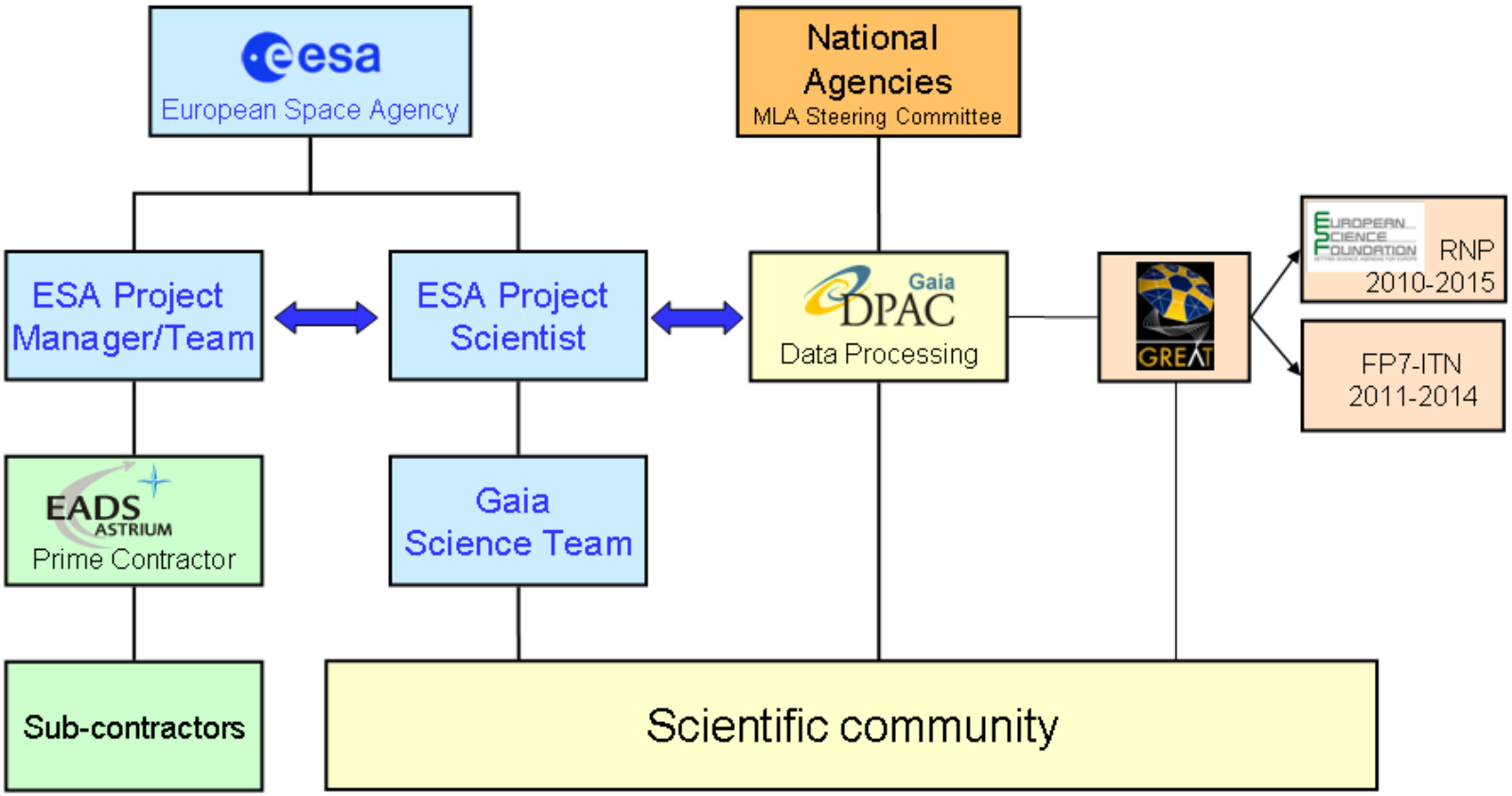
Gaia Catalog Coverage: View from Galactic Pole



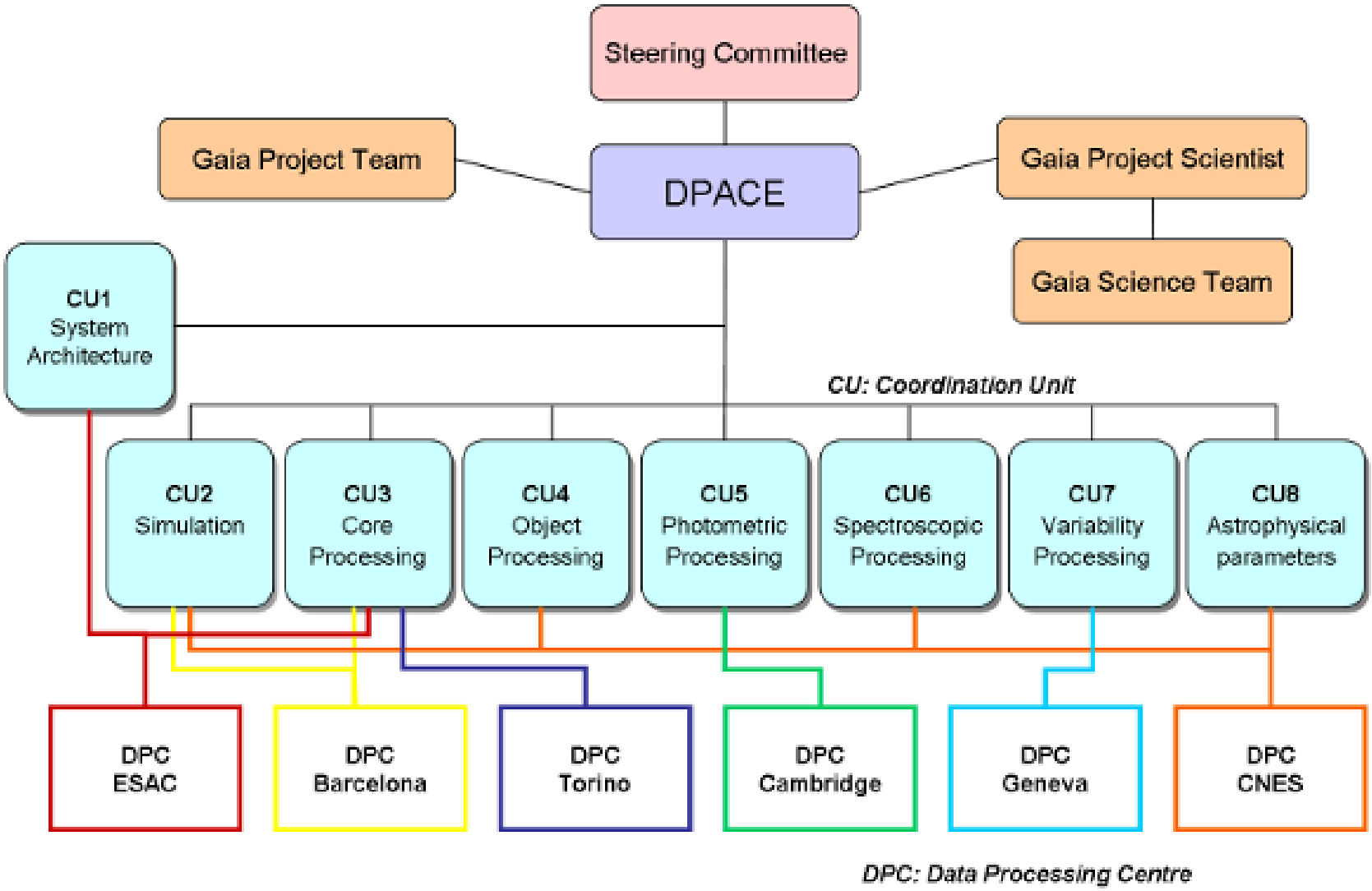
Gaia Catalog Coverage: View from Galactic Equator



The Gaia Organization Diagram



DPAC: Data Processing & Analysis Consortium



GREAT: Gaia Research for European Astronomy Training (www.ast.cam.ac.uk/ioa/GREAT/)

- GREAT ITN (Initial Training Network) programme
- GREAT ESF (European Science Foundation) programme
  - A pan-European research infrastructure to facilitate the fullest exploitation of the Gaia Catalog
  - Funding for workshops, conferences, training events, exchange visits, ...
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  - Christos Siopis (DU436 leader)
  - Brandon Tingley (now at IAC)
  - Gilles Sadowski (physicist, computer scientist)
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- Why bother with eclipsing binaries?
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  - Need for automated processing
  - DPAC enforces deadlines, programming guidelines, ...
    - Software must be implemented in Java!
    - Performance requirements
  - 5 (6?)-year baseline
    - Constrains EB periods
    - Slightly simplifies modeling
  - Important points of light curve not necessarily sampled
    - A consequence of the Gaia scanning law
    - Photometry: 30-200 transits per object ($\sim$80 mean)
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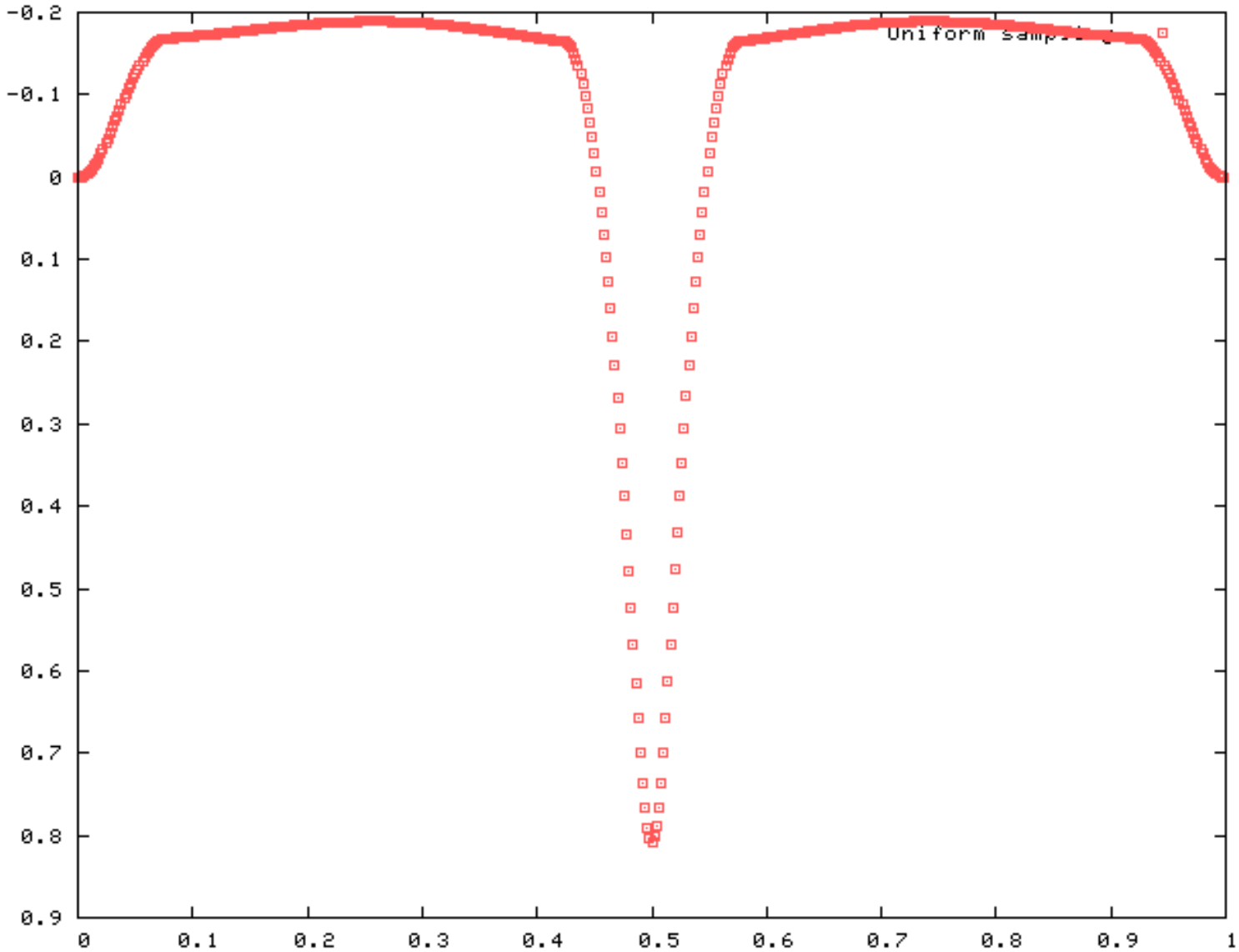
EB and Gaia Scanning Law



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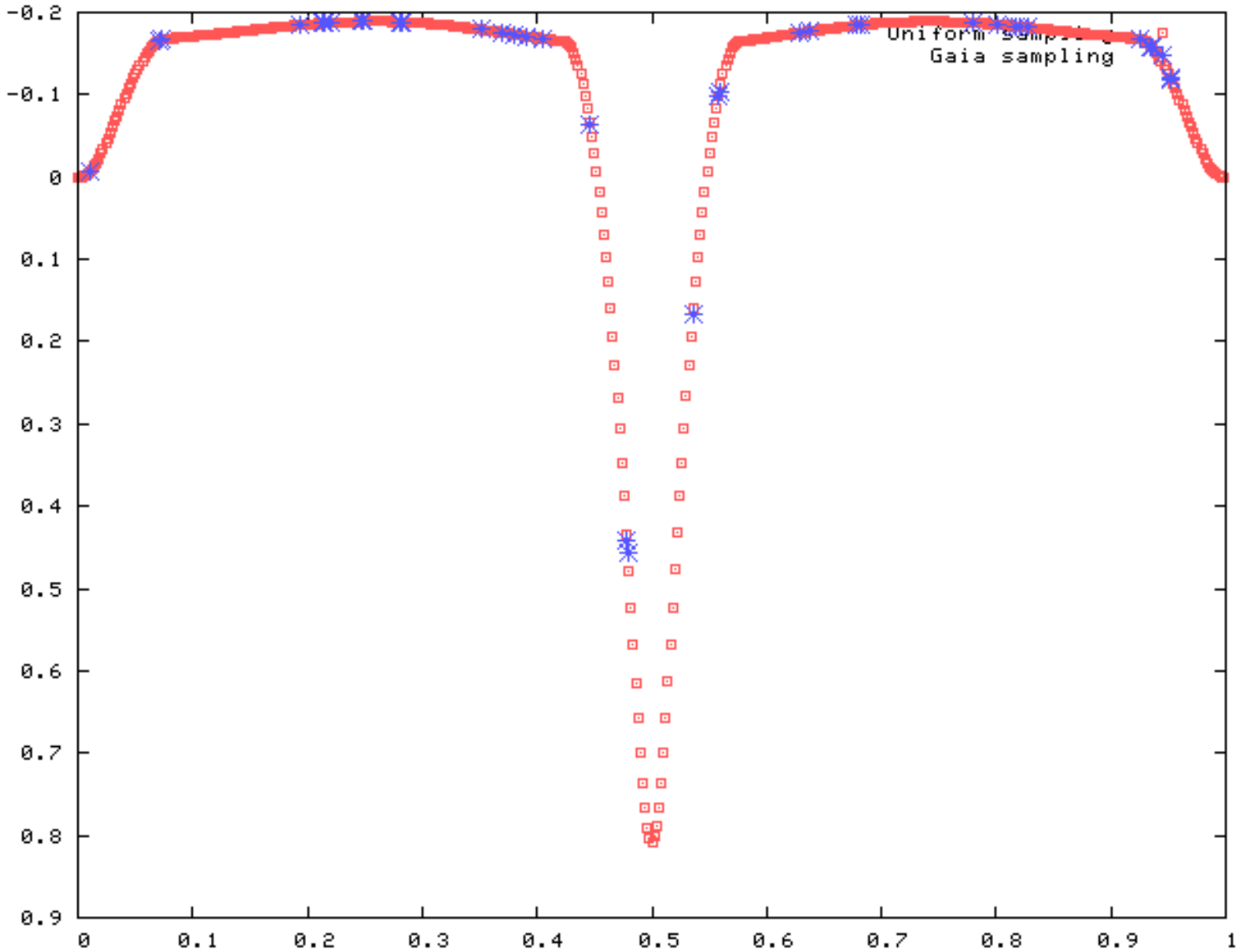

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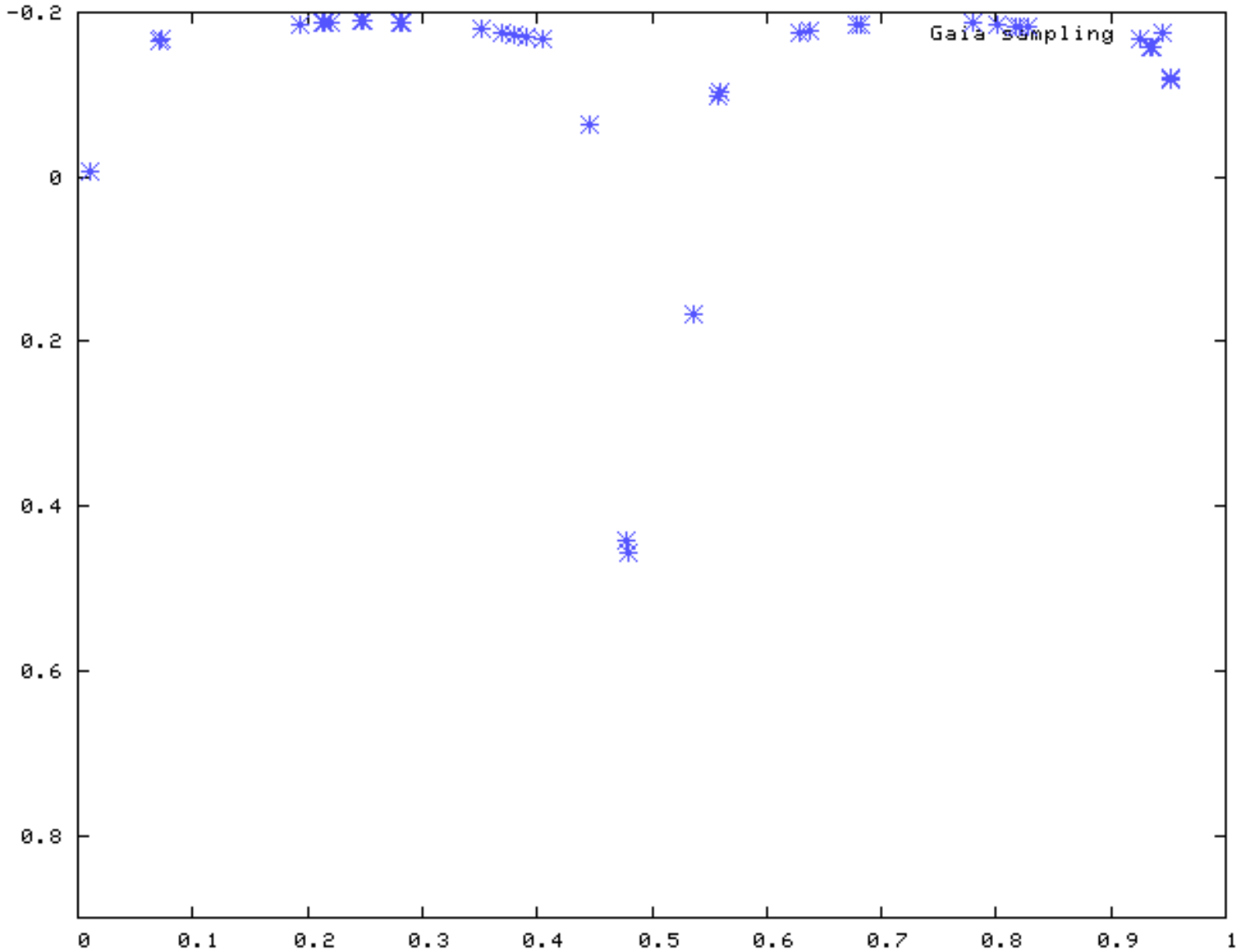

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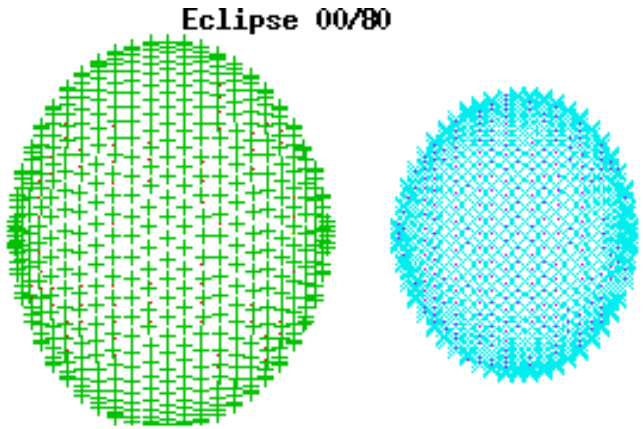

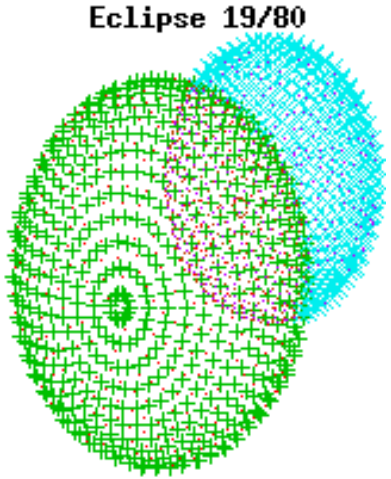

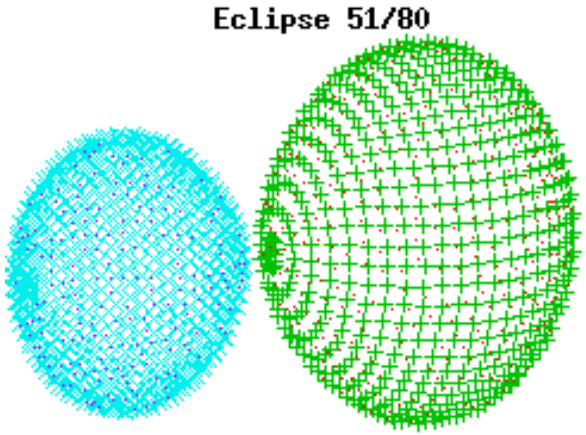

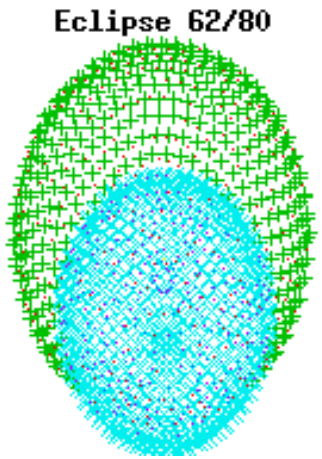

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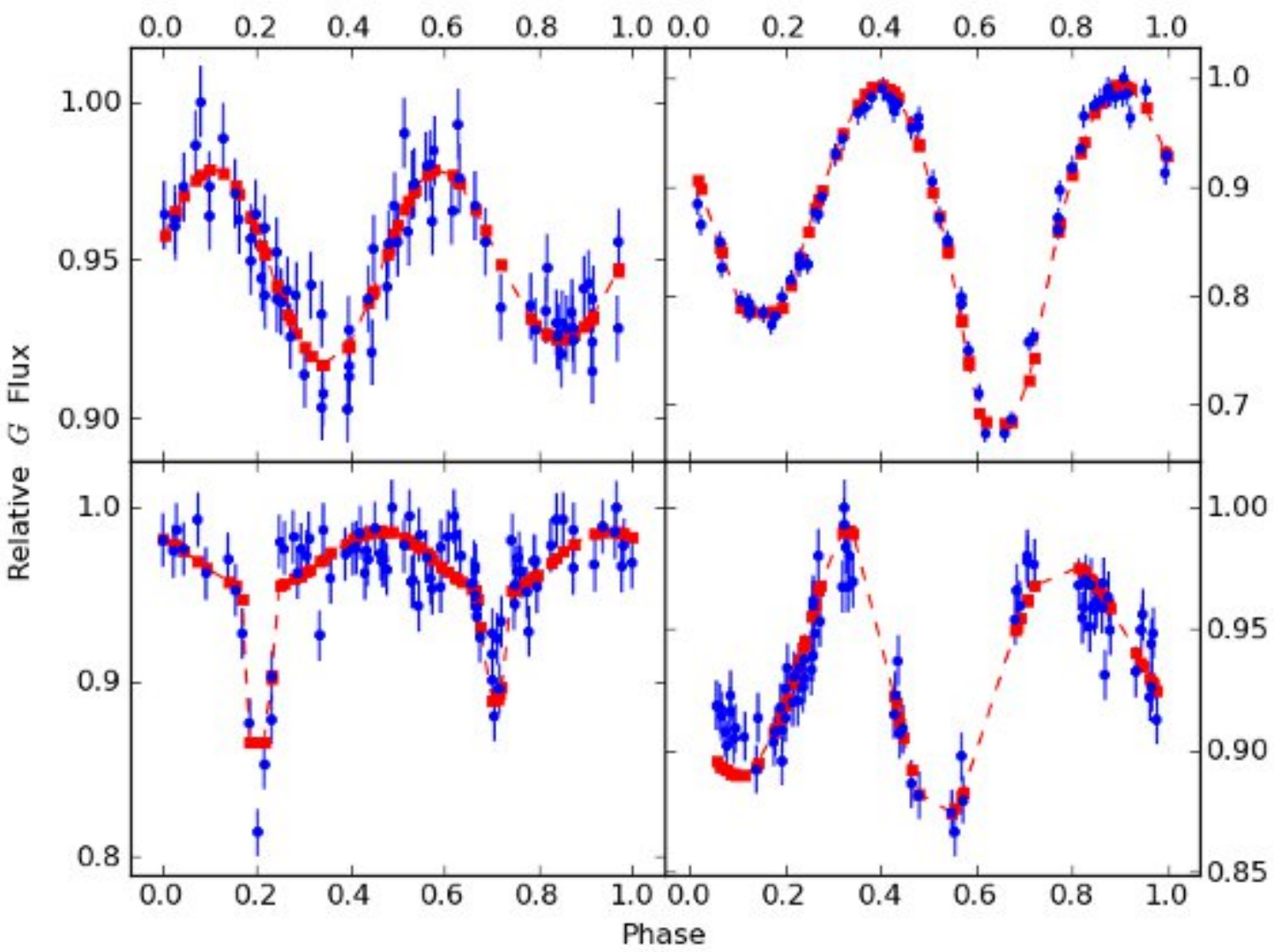

Remaining Work

- Detailed validation against, *e.g.*, Wilson-Devinney code
- Fine-tuning of the fitting procedure
- Extensive testing using EB light-curve data sets from the literature
- Implementation of error estimation
- Provide useful output to EB community (GAP/CU9)
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