The Gaia Mission: status and upcoming third data release

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Mission, Spacecraft and Payload Status

- Operations are nominal and smooth
- Minor disturbance (micrometeoroids, micro-clanks, fuel movements) which can be modelled in the astrometric solution
- Estimated depletion of propellant for micro-propulsion system is Jan-Apr 2025
- Mission formally extended to end 2022, with indicative approval to end 2025
- Request for definitive approval to end 2025 will be on ESA SPC agenda for 2022
Radiation Damage Evolution

CTI is still a factor 7 below pre-launch predictions
DR3 Content

- Expected Mid-2022 and will include:
- Gaia DR3 contents:
  - Object classification and astrophysical parameters (about $10^{8/9}$ objects)
  - BP/RP spectra ($10^{8/9}$, $G<17.6$) and RVS spectra (about 1M) for well-behaved objects.
  - Mean radial velocities ($GRVS<14$; about 33M).
  - Variable-star classifications and epoch photometry used for the stars.
  - Solar-system results with preliminary orbital solutions and individual epoch observations.
  - Non-single stars (a few $10^5$)
  - Quasars, galaxies (a few $10^6$) and Extended Objects results
  - Gaia Andromeda Photometric Survey (GAPS), consisting of the photometric time series for all sources located in a 5.5 degree radius field on the Andromeda galaxy (1M)

→ see focused talks during this meeting
Astrometry from Gaia DR2 to EDR3

Proper Motions

Parallaxes

Credit: M.Biermann and CU3 team
BP RP spectra

Internally-calibrated spectra

External instrument calibration

Externally-calibrated absolute spectra

Credits: ESA/Gaia/DPAC/CU5/ F. De Angeli
BP RP spectra of QSOs

RVS spectra

Gaia-RVS spectrum of HIP 86564  V=6.64, K5

Counts [e⁻]

Fe  Fe Ti  Fe  Fe
Ca  Ca  Ca

Credits: ESA/Gaia/DPAC/ P. Sartoretti & CU6 Team, A. Vallenari
First transiting exoplanet from Gaia

Gaia EDR3 3026325426682637824

P = 3.0525 +/- 0.0001 d
Mass = 1.1 +/- 0.1 M_J

Credits: ESA/Gaia/DPAC/CU7/TAU+INAF, Aviad Panahi, Shay Zucker, G. Clementini et al
A preview of astrophysical parameters

- M67 stars classified using BP RP spectra
  - APS from BP/RP spectra → ~500M stars

O. Creevey talk

Credits: ESA/Gaia/DPAC/CU8/ A. Vallenari, R. Andrae
Comparison with asteroseismic log(g)

Credits: ESA/Gaia/DPAC/CU8/ R. Andrae
Long term Planning

- DR4 not before end 2025, possibly later, including the full release of the nominal mission
  - Full astrometric, photometric, and radial-velocity catalogues.
  - All available variable-star and non-single-star solutions.
  - Source classifications (probabilities) plus multiple astrophysical parameters (derived from BP/RP, RVS, and astrometry) for stars, unresolved binaries, galaxies, and quasars. Some parameters may not be available for faint(er) stars.
  - An exo-planet list.
  - All epoch and transit data for all sources

- DR5 not before end 2028

- Intermediate focused product release

- Even longer term planning: Gaia-NIR (see David Hobbs talk)
Thank you for your attention