Gaia Errors

1. Gaia Error Model (astrometry, photometry, spectroscopy)
2. Code to simulate Gaia errors: public in github
3. **Simulating Gaia data: GOG (Gaia Object Generation)**
4. Gaia intermediate releases and TGAS solution:
    - Errors expected
    - Simulated catalogue (BGM)
5. Tutorial example:
    - Young Local Association (YLA)

GOG: Gaia Object Generator

An attempt to simulate Gaia products

Lastest version: GOGv16.0.0

Gaia challenge
August 31th, 2015
Erika Antiche

GOG

- Provides:
  - Epoch (transit) and combined (end-of-misssion) data
  - True data, data as observed by Gaia and their errors
- Is based on:
  - A model of the Gaia instruments
  - Error models provided by the CUs (DPAC) (final Gaia data will be more complex)
- Has two main simulation modes :
  - The GUMS universe model (integrated in GOG)
  - An external list of sources provided by the user

Gaia Universe Model Simulator

Published: Robin et al. 2012 A&A
Available at CDS

The Universe Model

Solar System

Sun, Earth, Moon
(not for observation)

Planets and satellites

Minor bodies
- Asteroids
- Comets
- Kuiper belt

Other components
- Zodiacal light
- Solar wind
- Etc.

Our Galaxy

Field stars
- "Normal"
- Multiple systems
- Variable stars

Stellar clusters
- Open clusters
- Globular clusters
- OB associations
- Stellar streams

Extended objects
- Planetary nebula
- HII regions
- Reflection nebula

Other components
- Galactic diffuse light
- Unresolved background stars
- Extrasolar planets

Extragalactic objects

Galaxies with resolved structure (List)
- Field stars
- Stellar clusters
- Surface brightness
- Supernovae

Galaxies with unresolved structure
- Surface brightness
- Supernovae

QSO

Other components
- Diffuse extragalactic light

Gaia error models in GOG

Astrometry

Photometry

Spectra

Radial Velocities

Rotational velocities

Astrophysical Parameters

GOG GUI <version 3.0>

File Tools Help

Configuration | Sources | Running output

General Information

Simulation reference :   GogGUI simulation

User email :   your@email.com

Properties File path :   [Browse]   [Edit]

conf/gog.properties

Thread pool size : ☐ Enable   [2]

Simulation parameters

Transit number :   [0]   ☑ Calibration noise

Overall mission margin :   [1.2]   ☑ Spatial resolution model

Reference row number :   [4]   ☐ CCD intra dispersion

Photometry aperture factor : [1.0]   Attitude model : [NSL ⬍]

Sf model :   ⦿ lsf   ◯ psf

Output

☑ True sources   ☐ Epoch parameters
☑ Noise   ☐ Epoch BPRP spectra
☐ Use healpix ID   ☐ Epoch RVS spectra
☐ Auxiliary data   ☑ Combined parameters
☐ Complete source   ☐ Combined BPRP spectra
☐ Covariance matrix   ☐ Combined RVS spectra

[Load XML] [Save] [Check data] [Reset]   [Run GOG] [Stop Execution] [Close]

Gaia
DPAC
Data Processing & Analysis Consortium

GOG GUI <version 3.0>

File   Tools   Help

Configuration   **Sources**   Running output

Choose the mode :   ● universe   ○ userSources

Limit faint G magnitude :   `20.0`

Limit bright G magnitude :   `17.0`

Universe Model Generat...

☑ Stars in the galaxy   ☐ Supernovas
☐ Unresolved galaxies   ☐ Solar system bodies
☐ Quasars   ☐ LMC
☐ Multiple sources   ☐ SMC
☐ HII region   ☐ Variable stars
☐ Open clusters   ☐ Exoplanets

Sky density reduction :   `1.0`

Extinction model :   `Drimmel ▼`

Sky background model :   ○ Off   ● Constant

Const. background value : `22.5`

Sky region :   `HTM ▼`

Sky region: HTM

Coordinate syste...   `GAL ▼`

HTM level :   `6`

☐ Specific HTM Name

HTM name :   _____

Coordinate X: `180`

Coordinate Y: `20`

[Load XML]   [Save]   [Check data]   [Reset]   [Run GOG]   [Stop Execution]   [Close]

GOG GUI <version 3.0>

File   Tools   Help

Configuration | Sources | **Running output**

```
12:12:00 INFO       g.GogSimulation – GOG Version:16.0.0
12:12:00 INFO       g.GogSimulation – GaiaSimu Version:16.0.0
12:12:00 WARN        g.c.t.GaiaTools – Failed to read manifest of JAR: /home/hpc/caronte/eantiche/workspace/Gog/bin
12:12:00 INFO       g.GogSimulation – GaiaTools Version:17.3.0
12:12:00 INFO       g.GogSimulation – GaiaParameterDataBase Version:17-1-0
12:12:00 INFO       g.GogSimulation – Simulation Reference:GogGUI_simulation
12:12:00 INFO       g.GogSimulation – Number of threads:2
12:12:00 INFO       g.GogSimulation – Configuration File Name:null
12:12:00 INFO       g.GogSimulation – Properties File Name:conf/gog.properties
12:12:00 INFO       g.GogSimulation – OS System: Linux
12:12:00 INFO       g.GogSimulation – Local host machine: caronte/161.116.78.135
12:12:00 INFO       g.GogSimulation – Outputs of the simulation:
12:12:00 INFO       g.GogSimulation – – Sources from the Universe Model (UM): true
12:12:00 INFO       g.GogSimulation – – Epoch Data Generation: false
12:12:00 INFO       g.GogSimulation – – Combined Data Generation: true
12:12:00 INFO       g.GogSimulation – – Epoch XP Spectra: true
12:12:00 INFO       g.GogSimulation – – Epoch RVS Spectra: false
12:12:00 INFO       g.GogSimulation – – Combined XP Spectra: false
12:12:00 INFO       g.GogSimulation – – Combined RVS Spectra: false
12:12:00 INFO       g.GogSimulation – – Auxiliary: false
12:12:00 INFO       g.GogSimulation – ------------------------------------------------
12:12:00 WARN        g.GogSimulation – The simulation directory already exist.
```

0%   ETR: Clear

Load XML | Save | Check data | Reset | Run GOG | Stop Execution | Close

TERMS OF USE

The simulations and software tools provided by CU2 can only be used for DPAC related activities.

Any other use requires explicit permission from the CU2 management.

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