

**GOG 11.0**

**This document describes the input and output parameters, their formats and their units**

UMStellar.ascii, UMStellar.gbin and the GOG output for CU3, CU5, CU6 and CU8 parameters

**UMStellar.ascii**

Index in GOG code	Name	Format (fortran)	Units, comments, ...
0	<b>sourceExtendedId</b>	A1	* means the source is a MW star
1	sourceExtendedId	A16	Not used, will be generated inside GOG
2	<b>nc</b>	2X,I1	Number of components of a multiples system
3	<b>nt</b>	2X,I1	Total number of object
4		A1	(blank)
5	<b>host</b>	1X,I1	1=Milky Way
6	<b>Astrometry[alpha]</b>	1X,F14.10	Degrees
7	<b>Astrometry[delta]</b>	1X,F14.10	Degrees
8	<b>Astrometry[distance]</b>	1X,F14.4	Pc
9	<b>Astrometry[muAlpha]</b>	1X,F10.4	mas/yr
10	<b>Astrometry[mudelta]</b>	1X,F10.4	mas/yr
11	<b>Astrometry[radialVelocity]</b>	1X,F10.4	Km/s
12	ipop	1X,I2	Population flag from BGM (1 to 15)
13	Population <sup>(1)</sup>	1X,F9.4	Age (Gyr)
14	<b>feH</b>	1X,F9.4	Dex
15	AlphaFe	1X,F9.4	Dex
16	<b>Visual Absorption - Av</b>	1X,F9.4	Mag
17	<b>Rv: Total to selective abs.</b>	1X,F5.2	Adimensional
18	Photometry[magG] <sup>(2)</sup>	1X,F7.4	Mag
19	Photometry[magGRp] <sup>(2)</sup>	1X,F7.4	Mag
20	Photometry[magGBp] <sup>(2)</sup>	1X,F7.4	Mag
21	Photometry[magGRvs] <sup>(2)</sup>	1X,F7.4	Mag
22	<b>colorVminusI</b>	1X,F7.4	Intrinsic (V-I) colour
23	<b>meanAbsoluteV</b> <sup>(3)</sup>	1X,F7.4	Mv: visual absolute magnitude (mag)
24	mbol	1X,F7.4	
25	mass	1X,F7.4	
26	radius	1X,F10.4	
27	<b>Teff</b>	1X,F9.2	K
28	<b>logg</b>	1X,F4.2	Dex
29	SpectralType <sup>(4)</sup>	1X,A1,I1	Spectral Type
30	vsini	1X,I1	Vsini (Km/s)
31		1X,F7.4	Parameters describing variability for emission line stars
32		1x,F4.1	
33		1X,I2	

## Notes to the input parameters in UMStellar.ascii

GOG uses the parameters in bold for the computation of the Gaia errors

(1): Age in Gyr is treated in the GogUMAscii2GbinAdapter tool in the following way: in the BGM model fifteen populations are defined, that is, 1,2,3,4,5,6,7 for the thin disk, 8 for the thick disk, 9 for the bulge, ...and like this up to 15. For example, in the case of the thin disk each population - 1,2,3,4,5,6,7 - corresponds to an age interval with values 0, 0.15, 1,2,3,5,7,10 Gyr ( example: one star with population= 1 have an age in the interval between 0 and 0.15Gyr) . The GOG tool at present compare the age of the star (in this case 8.9151Gyr) with the mean values of the age intervals (0.075, 1.5, ...) and in case there is no match it assigns a default value of 99.0.

(2): The values of  $G$ ,  $GR_p$ ,  $GB_p$  and  $GR_v$ s included in this file are not used as input in GOG. This values are computed internally by GOG from  $M_v$ ,  $(V-I)_o$ ,  $r$ , and  $A_v$ .

(3): As can be seen the  $V$  apparent magnitude of the star is not an input for GOG. GOG takes the visual absolute magnitude ( $M_v$ ), the interstellar absorption ( $A_v$ ) and the distance ( $r$ ) to compute the  $G$  apparent magnitude of the source.

## UMStellar.gbin

This file is created from the GogUMAscii2GbinAdapter and contains all the true parameters of the source to be used for the derivation of the observed quantities and the errors

Name	Units	Comments
age	Gyr	
alphaFe	dex	
Astrometry[alpha]	degrees	
Astrometry[delta]	degrees	
Astrometry[distance]	pc	
Astrometry[muAlpha]	mas/yr	
Astrometry[mudelta]	mas/yr	
Astrometry[radialVelocity]	Km/s	
bondAlbedo		
colorVminusI	mag	Intrinsic (V-I)
excentricity		
feH	dex	Dex
flaginteracting		
geomAlbedo		
hasPhotocenterMotion		
host		'1' indicates that the source belong to the MW
inclination		
logg	dex	Dex
longitudeAscendingNode		
mass		Solar mass
mbol	mag	Mag
meanAbsoluteV	mag	Mag
nc		
nt		
orbitPeriod		
periastronArgument		
periastronDate		
phase		
Photometry[magG]	mag	Mag
Photometry[magGBp]	mag	Mag
Photometry[magGRp]	mag	Mag
Photometry[magGRvs]	mag	Mag
Population		
rEnvRStar		
radius		
semimajorAxis		
SpectralType		Not used in the error computation but shall have a realistic values (OBAFGKM)
Teff	Kelvin	
variabilityAmplitude		
variabilityPeriod		
variabilityPhase		
vsini		
sourceExtendedId		
sourceId		

**CU3 Astrometric data : mdbcu3agissource\_gog11\_0\_beta.gbin**

<b>CU3 Astrometric data</b>	units	Comments
alpha	rad	
alphaError	mas	See note below
delta	rad	
deltaError	mas	
muAlphaStar	mas/yr	
muAlphaStarError	mas/yr	
muDeltaStar	mas/yr	
muDeltaStarError	mas/yr	
radialVelocity	km/s	
radialVelocityError	km/s	
refEpoch	[null ]	TBC
varpi	mas	Parallax
varpiError	mas	Error in parallax

**CU5 Photometric data : mdbcu5calphotsource\_gog11\_0\_beta.gbin**

(to be read using MDB v11.o)

<b>CU5 Photometric data</b>	units	Comments
bpmean[flux]		
bpmean[fluxerror]		
rpmean[flux]		
rpmean[fluxerror]		
gpmean[flux]		
gpmean[fluxerror]		
Bpmean[flux]		

**CU6 RVsdata : mdbcu6sourcstellarsourcemeancharacteristics\_gog11\_0\_beta.gbin**

<b>CU6 RVsdata</b>	units	Comments
gRvs[value]	mag	
gRvs[gmdberror]	mag	

**CU8 data : mdbcu8starparamsphot\_gog11\_0\_beta.gbin**

<b>CU8 data</b>	units	Comments
a0[val]	mag	Zero point extinction law (Cardelli et al.)
a0[gmdberror]	mag	
feH1[val]	dex	
feH1[mdberror]	dex	
Teff1 [val]	kelvin	
Teff1[mdberror]	kelvin	
logG1[val]	dex	
logG1[mdberror]	dex	

## Notes to the output GOG 11.0 parameters

- (1) **AlphaError** (units: mas) is in fact the error in right ascension in true arcs on the sky, that is this error should be named **AlphaStarError** and is the error in the variable  $\alpha_{\{*\}} = \alpha * \cos(\delta)$
- (2) The errors in the atmospheric parameters provided by GOG11 are underestimated as described in Liu et al. 2012, MNRAS, 426, 2463  
<http://adsabs.harvard.edu/abs/2012MNRAS.426.2463L>  
(see the notes in the appendix)