First impressions on the Gaia harvest of variable objects in DR3

Teaser presentation for DR3

Laurent Eyer, University of Geneva

On behalf of CU7/DPCG teams

M. Audard, P. García-Lario, P. Gavras, B. Holl, G. Jevardat de Fombelle, I. Lecoeur-Taïbi, N. Mowlavi, K. Nienartowicz, L. Rimoldini, L. Rohrbasser, P. Abraham, A. Binnenfeld, M.I. Carnerero Martin, G. Clementini, J. De Ridder, D. W. Evans, E. Distefano, S. Faigler, A. Garofalo, R. Gomel, A. Kospal, K. Kruszynska, A. C. Lanzafame, T. Lebzelter, G. Marton, R. Molinaro, T. Muraveva, A. Panahi, C. Raiteri, V. Ripepi, S. Leccia, M. Marconi, T. Mazeh, L. Molnár, M. Pawlak, E. Plachy, L. Szabados, E. Szegedi-Elek, L. Wyrzykowski, S. Zucker,
F. Barblan, M. Grenon, A. Kochoska, A.F. Lanza, S. Messina, I. Musella, I. Pagano, A. Prša

+ ALL DPAC (CU3,5,6)

EAS 2021 from home, Pully, Switzerland

Monday, June 28, 2021

12h10-12h20 (CET)

Gaia Data Releases for the “Variables”: An iterative approach

	Input Data from CU3,5,6	Output Data to the Gaia Archive	Number of variability classes	Number of sources
DR1 (Sept. 2016)	FoV G-band	Epoch data: Time series of… FoV G-band +Parameters	2 Variability Types	3,194
DR2 (Apr. 2018)	FoV G-band (per CCD Phot.) +Astrometry +BP/RP integrated	FoV G-band +BP/RP integrated +Parameters	7 Variability Types	550,737
DR3 (first half of 2022)	FoV G-band (per CCD Phot.) Astrometry BP/RP integrated +BP/RP spectra +Radial Velocity	Time series of… FoV G-band BP/RP integrated +Radial Velocity +Parameters	24+1 Variability Types	14,000,000

Some statistics

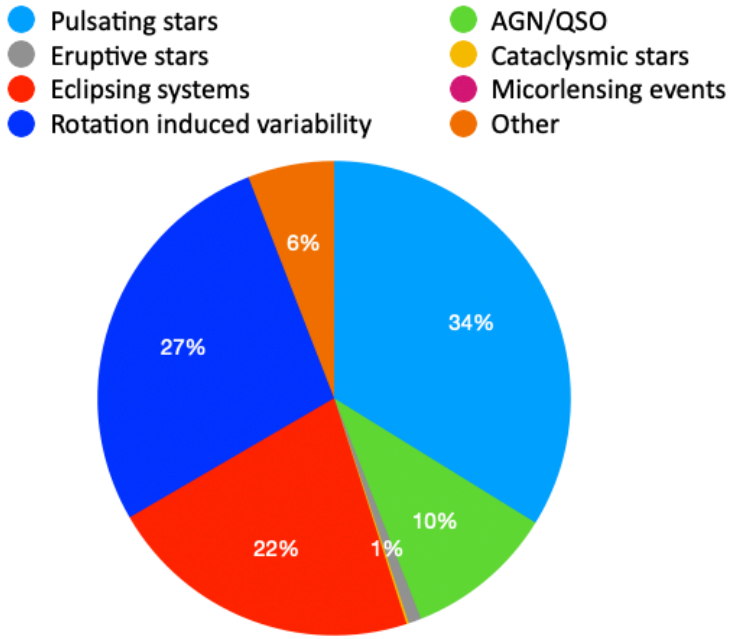
~14,000,000 sources

(A) ~1,300,000 objects in GAPS: Gaia Andromeda Photometric Survey (pencil beam of 5.5 deg), variable objects or not (detected as) variable (Riello et al. in prep)

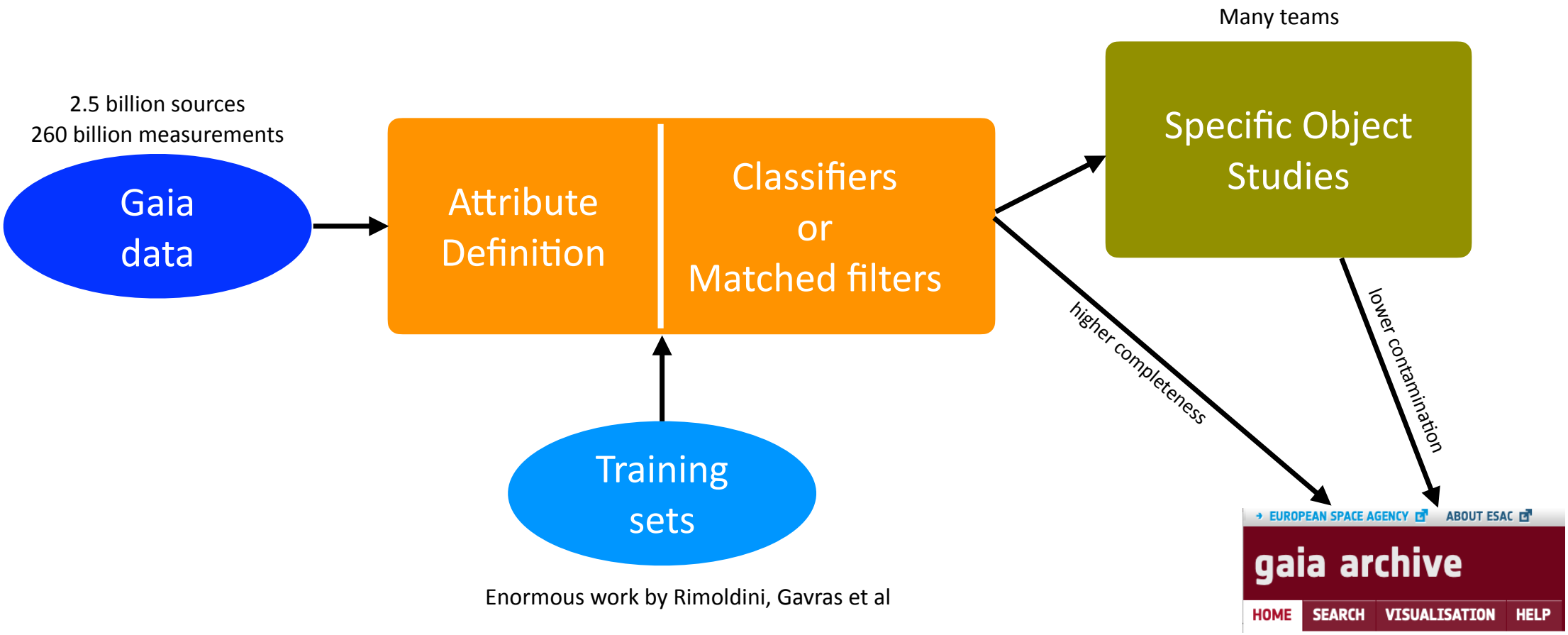
(B) ~2,500,000 galaxies, without time series

(C) 10,000,000 objects

~2,000 with radial velocity time series

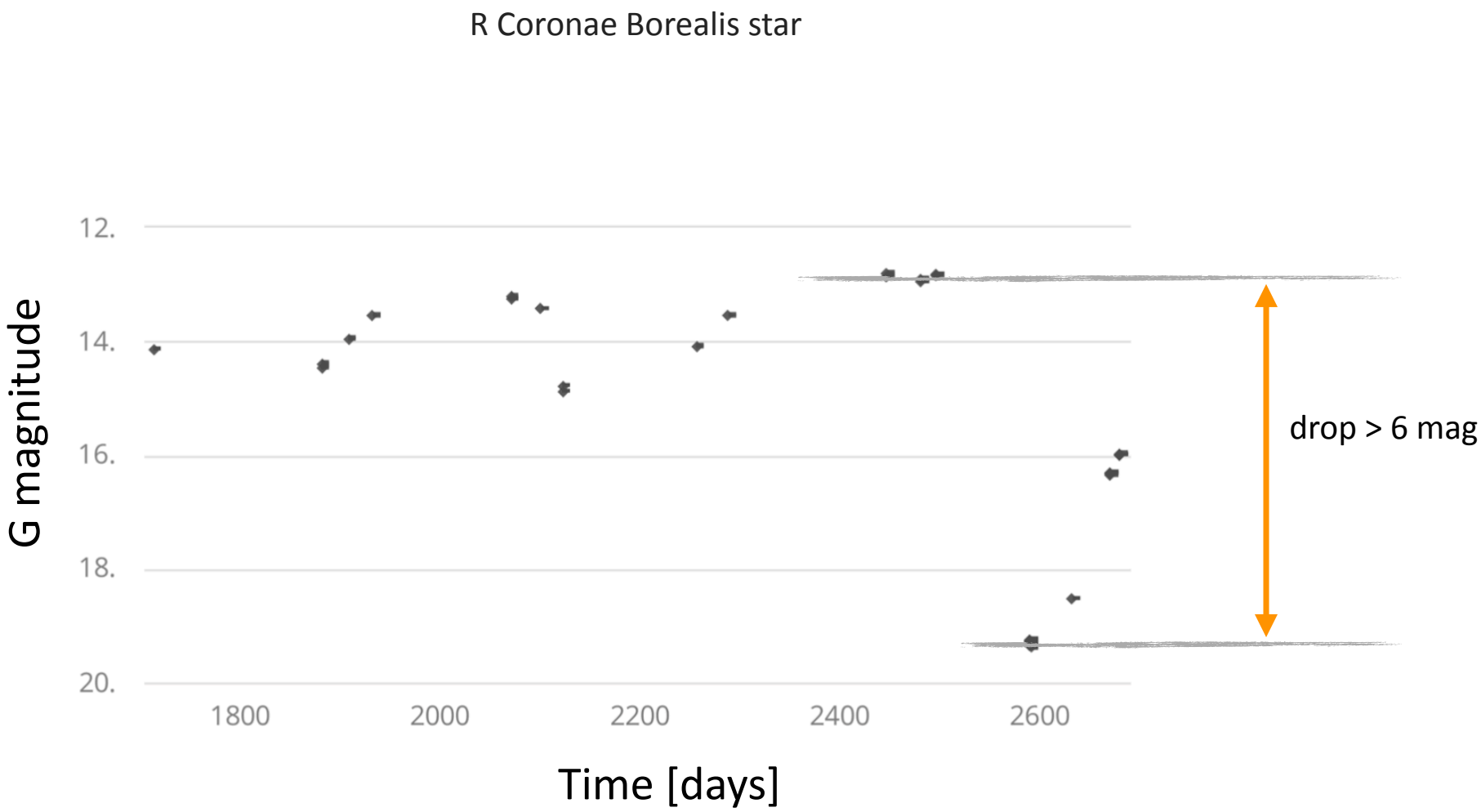


Method


2.5 billion sources
260 billion measurements
Gaia data
Attribute Definition
Classifiers or Matched filters
Training sets
Enormous work by Rimoldini, Gavras et al
Many teams
Specific Object Studies
higher completeness
lower contamination
EUROPEAN SPACE AGENCY
ABOUT ESAC
gaia archive
HOME
SEARCH
VISUALISATION
HELP

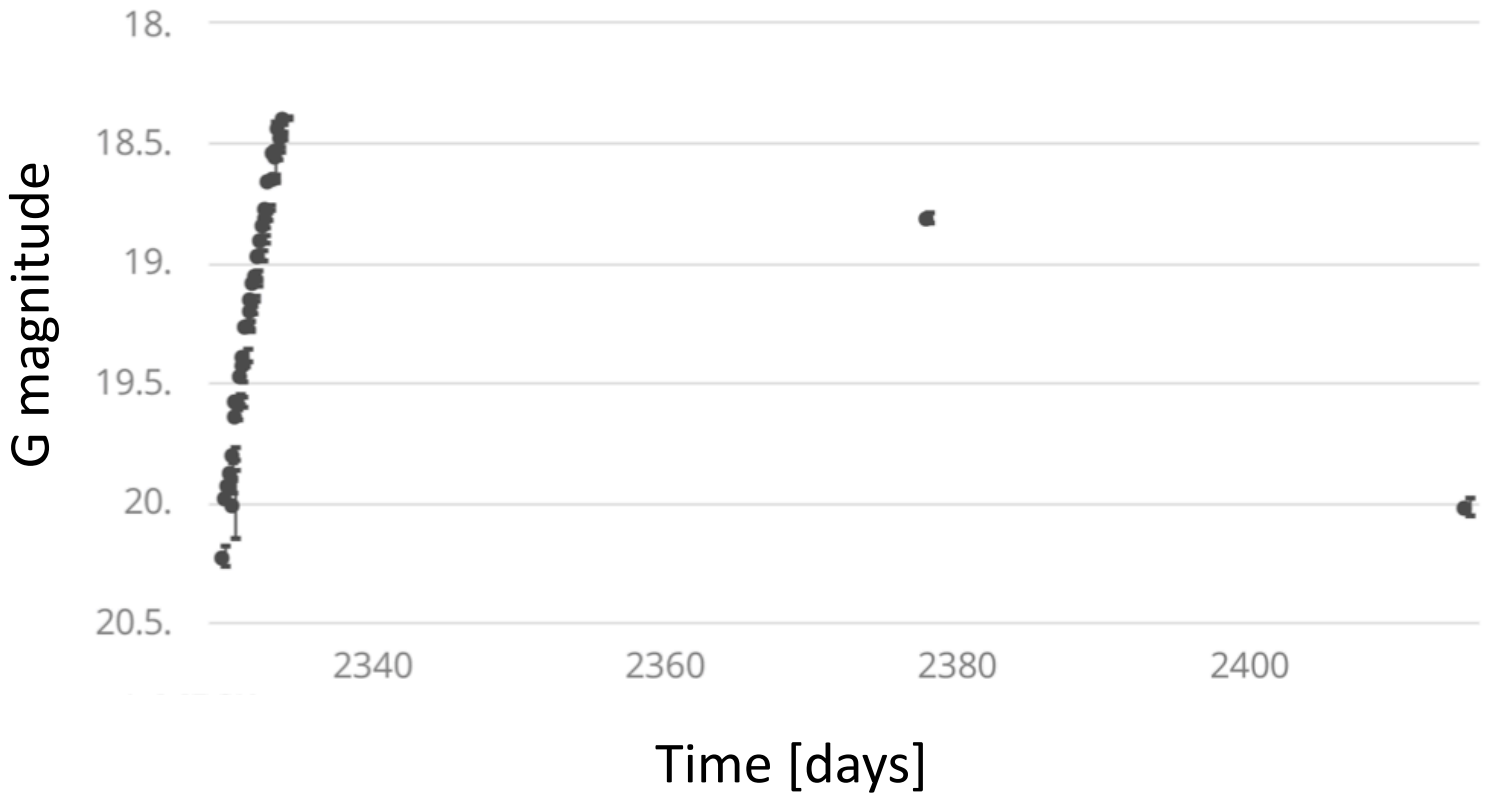
Some examples: R Coronae Borealis stars

Panos Gavras, L. Rimoldini



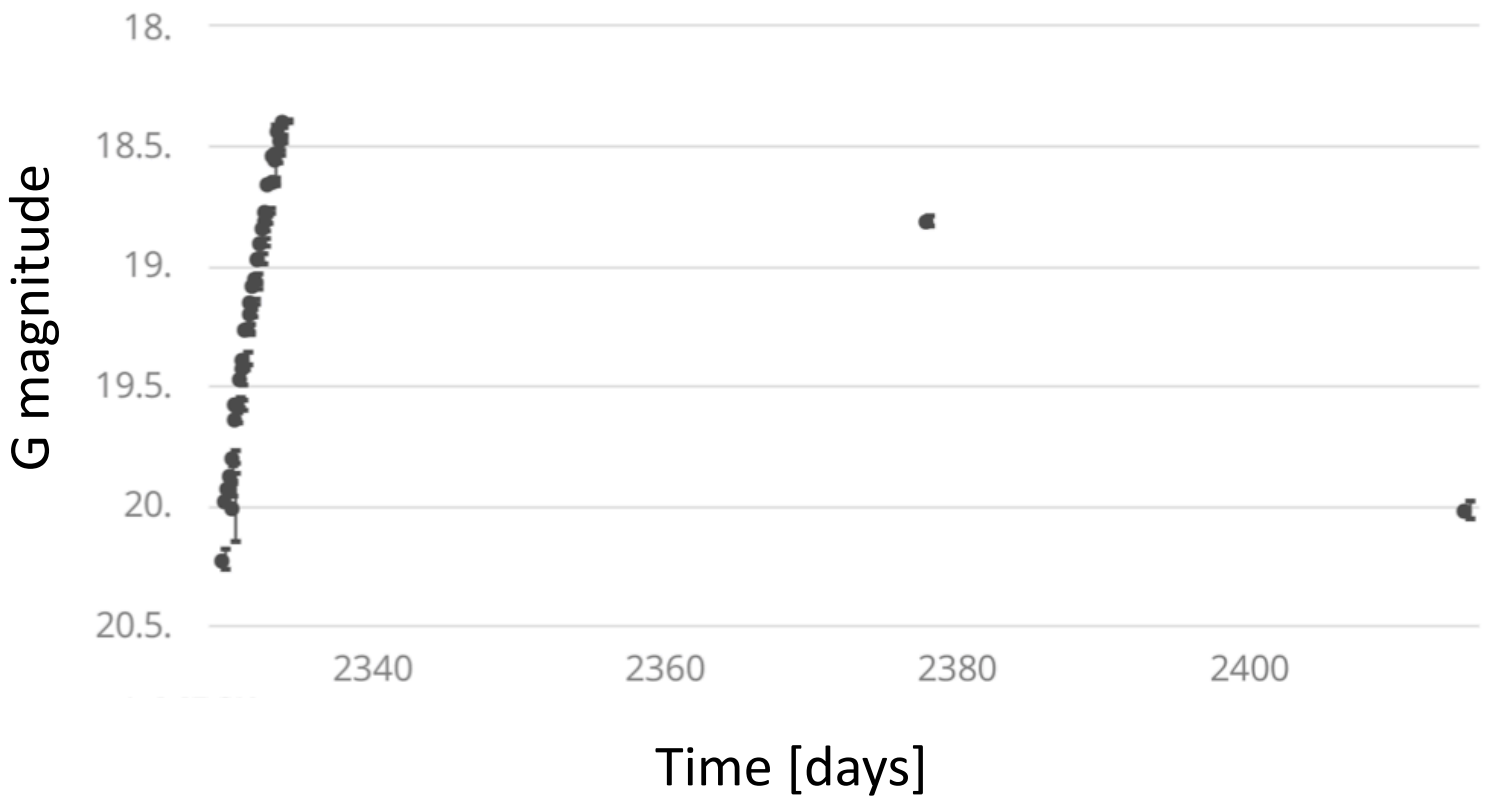
SuperNovae

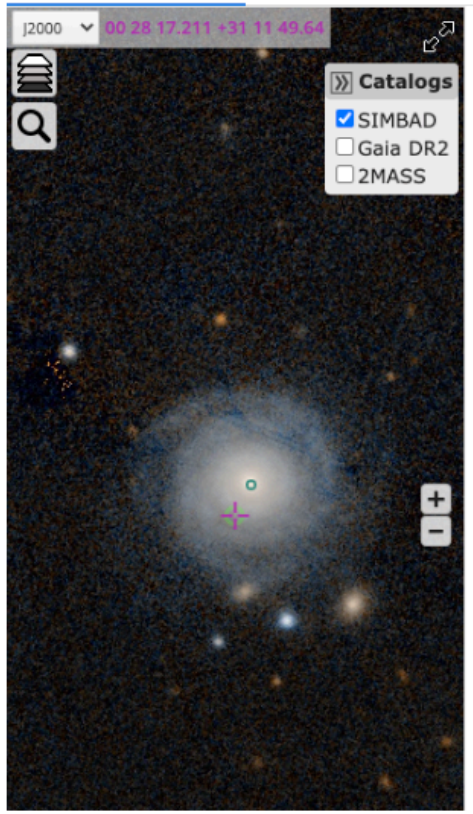
Panos Gavras



SuperNovae

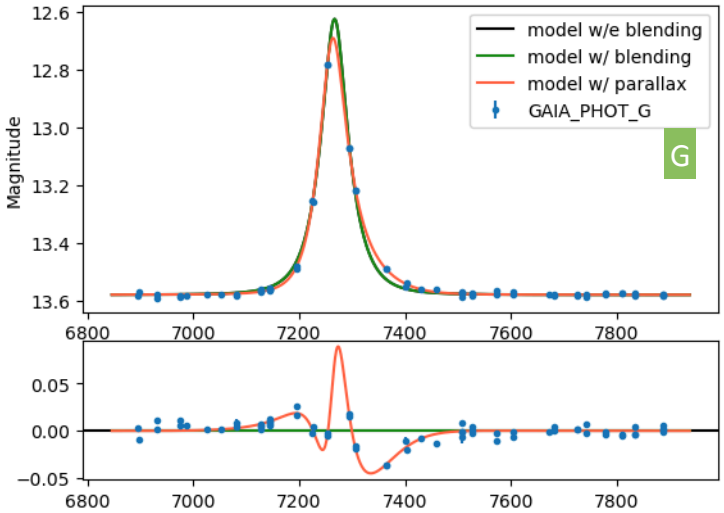
Panos Gavras

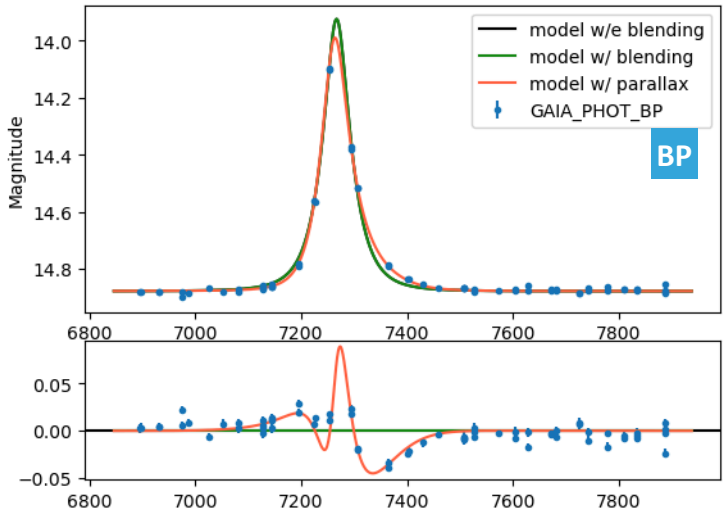


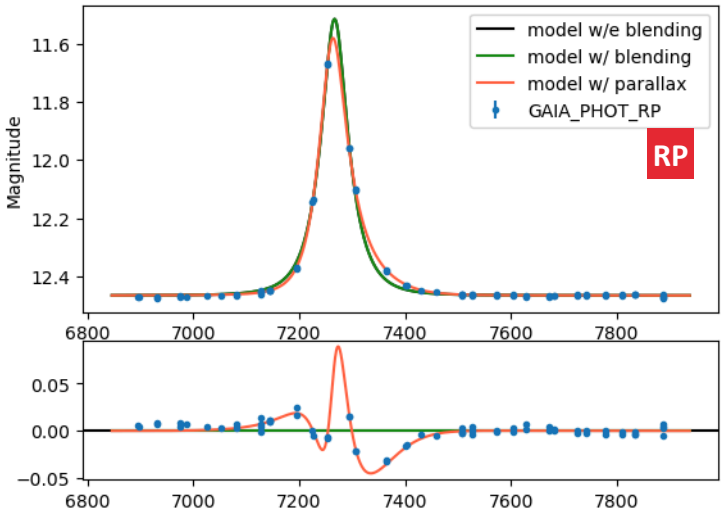


Microlensing: A new event

Lukasz Wyrzykowski, Katarzyna Kruszynska, Kris Rybicki (Warsaw), Nami Mowlavi, Isabelle Lecoeur-Taibi, Berry Holl (Geneva), Dafydd Evans (Cambridge)





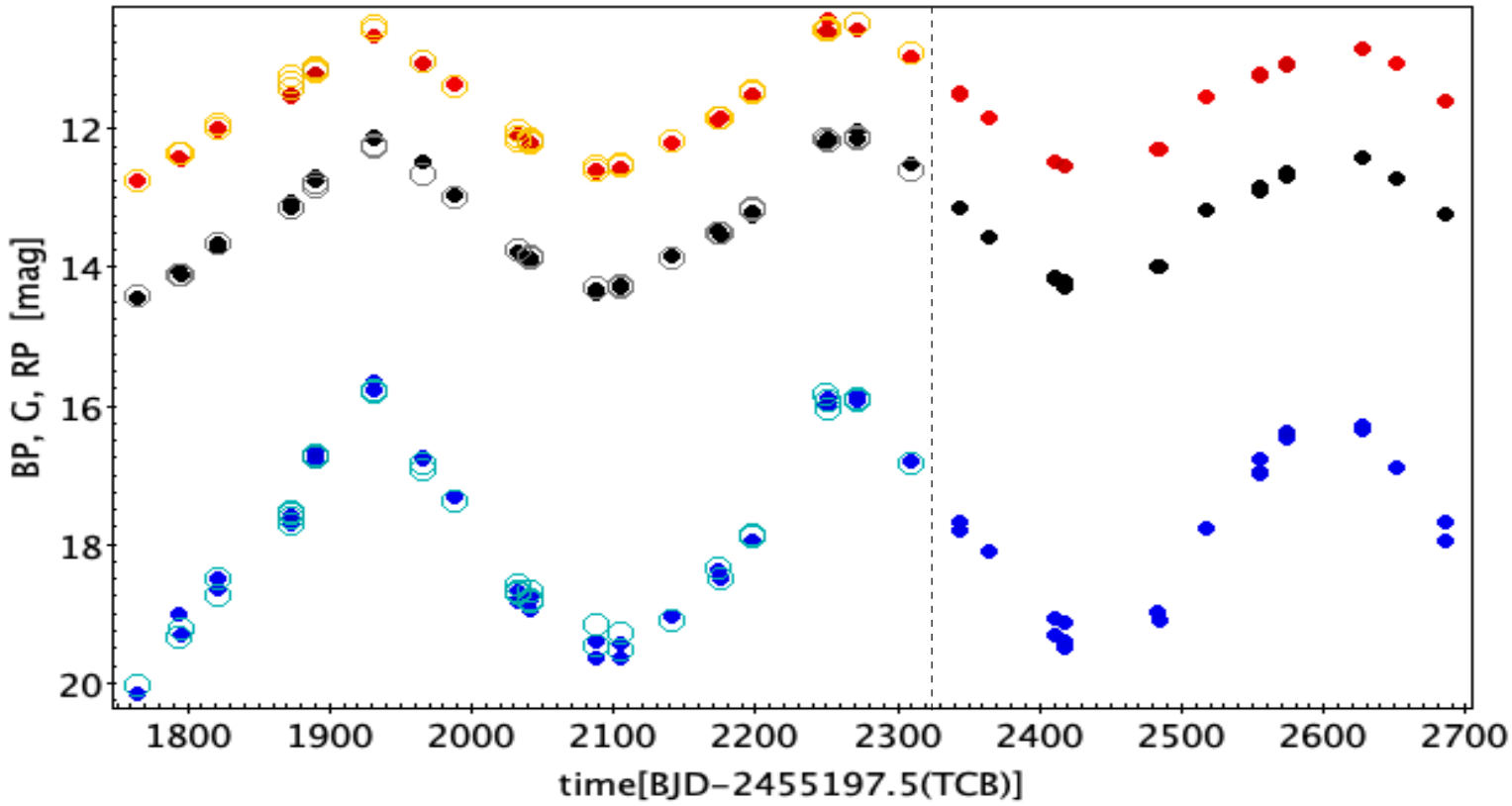


Parameters of the fit in the Gaia archive

see presentation of L.Wyrzykowski
@ this conference

Long period variables

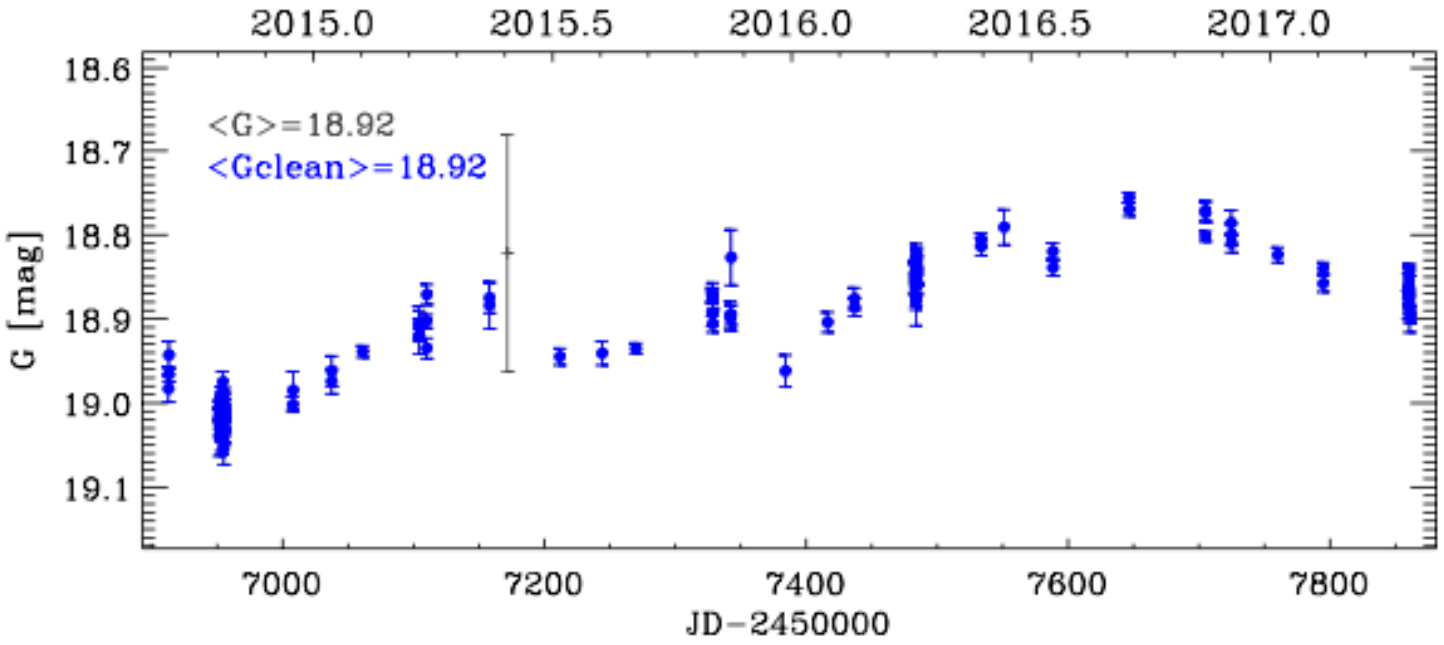
Nami Mowlavi, Thomas Lebzelter, Isabelle Lecoeur-Taibi, Michele Trabucchi



RP spectra used to
distinguish between C-rich or O-rich LPVs

AGN/QSO

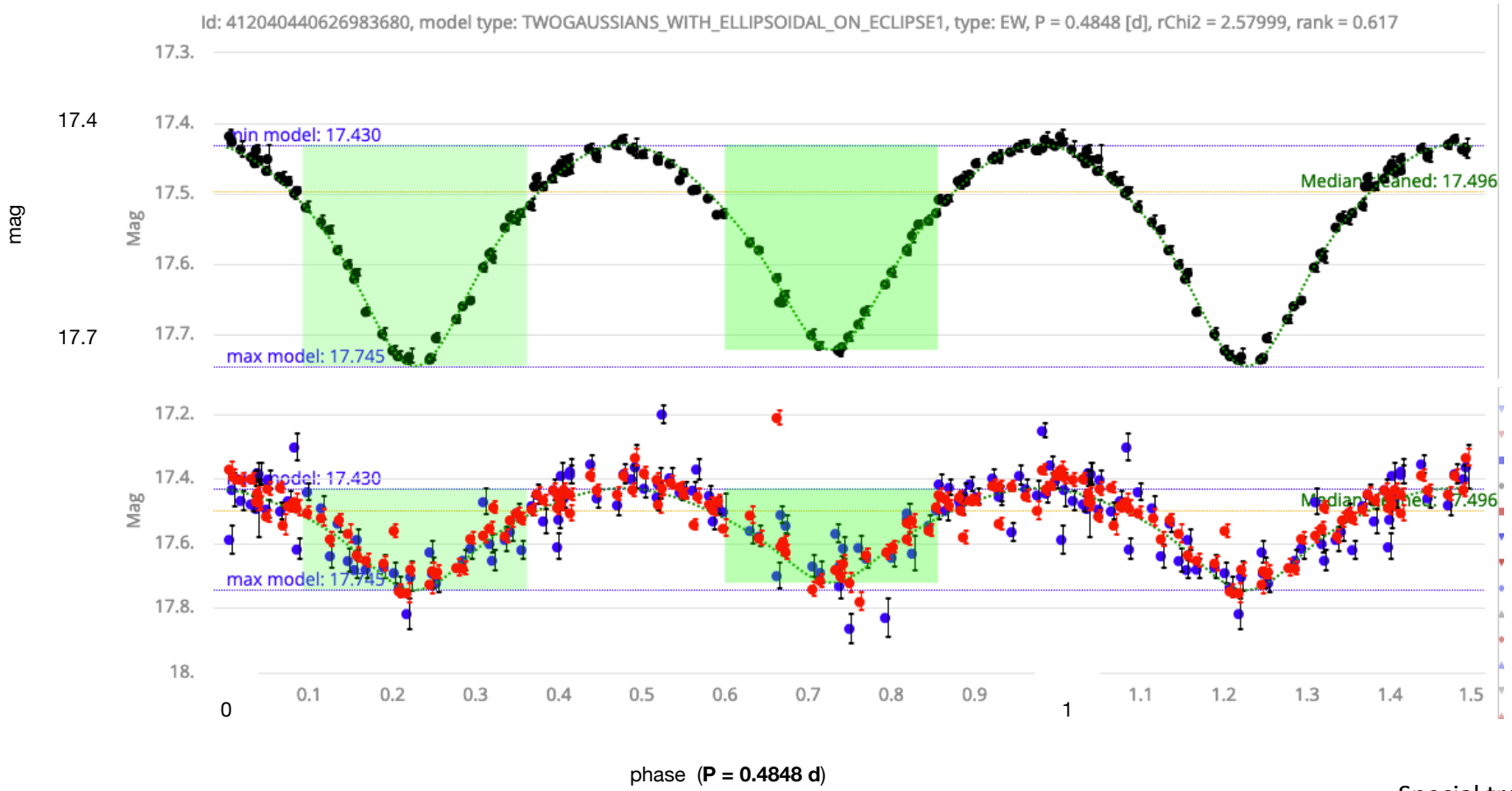
Maria Isabel Carnerero, Claudia Raiteiri, Enrico Licata, Deborah Busonero



Parameters from the structure function in the Gaia archive

Eclipsing binaries

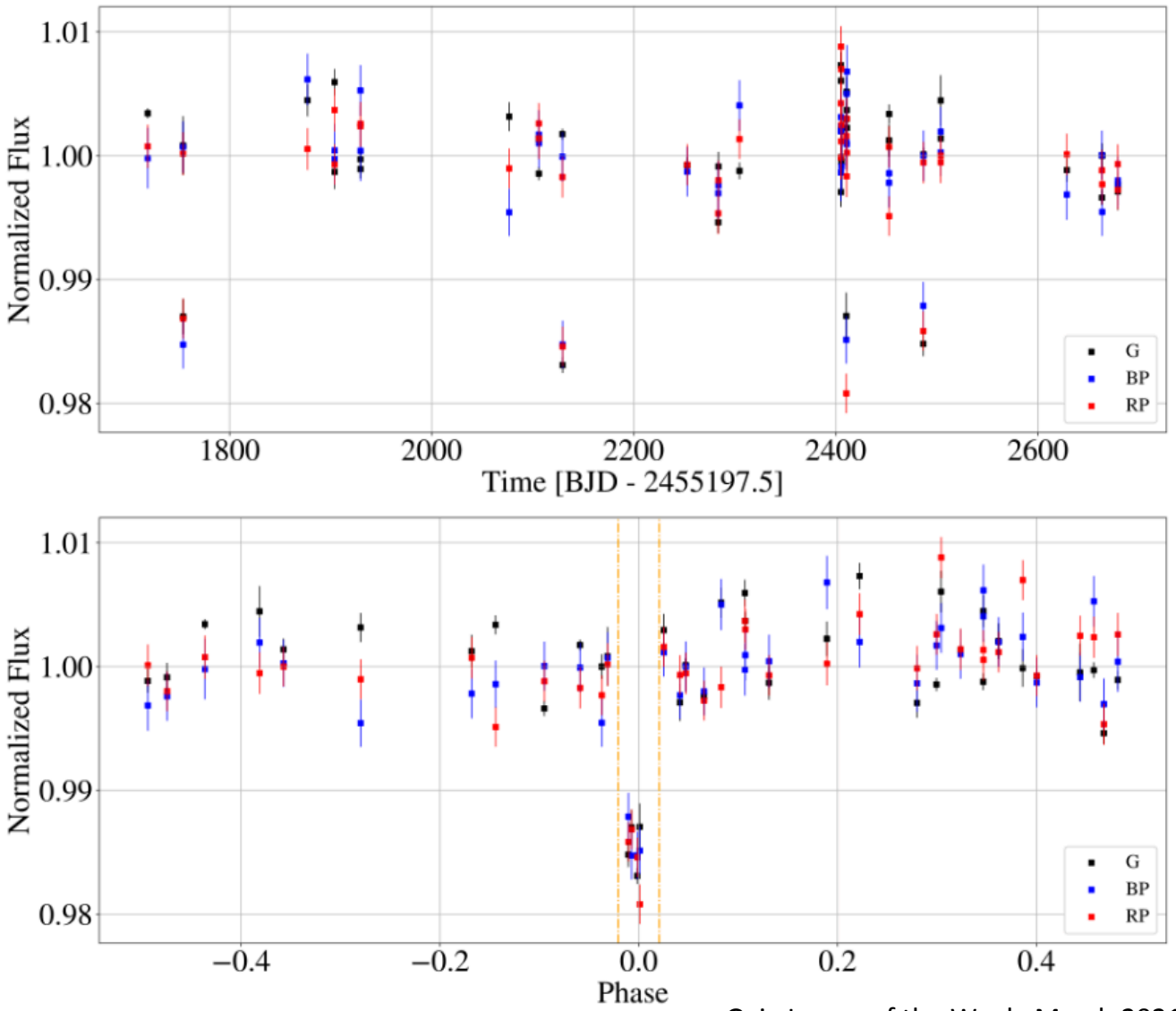
Nami Mowlavi,, Isabelle Lecoeur-Taibi, Berry Holl, Fabio Barblan



Special treatment by the Non-Single-Star group: see Arenou's presentation @ this meeting

First transiting Exoplanet

In DR3:
list of candidates
+
treatment of known exoplanets

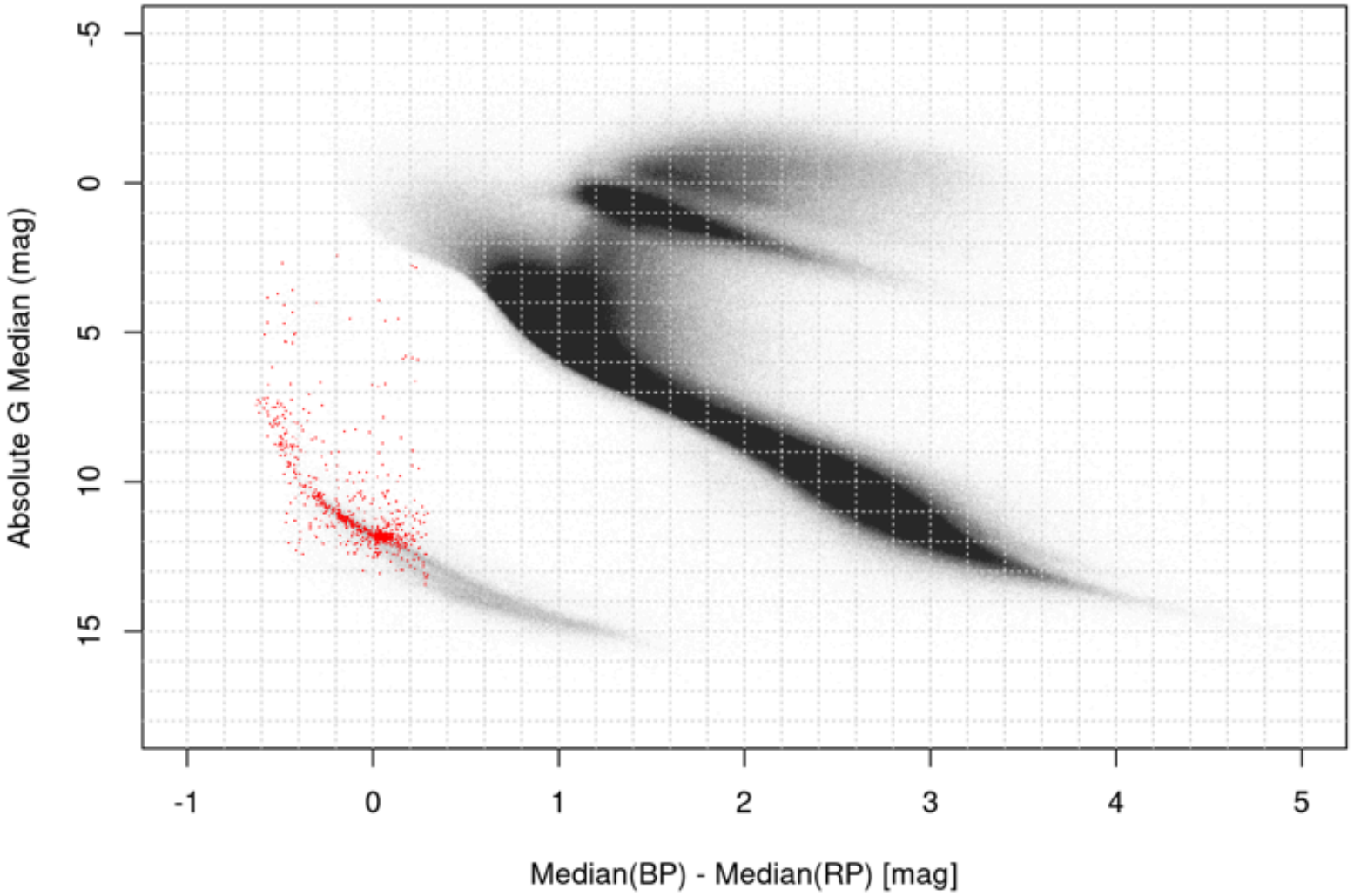


Gaia Image of the Week, March 2021

See
Aviad Panahi's presentation
@ this conference

Variable white dwarfs

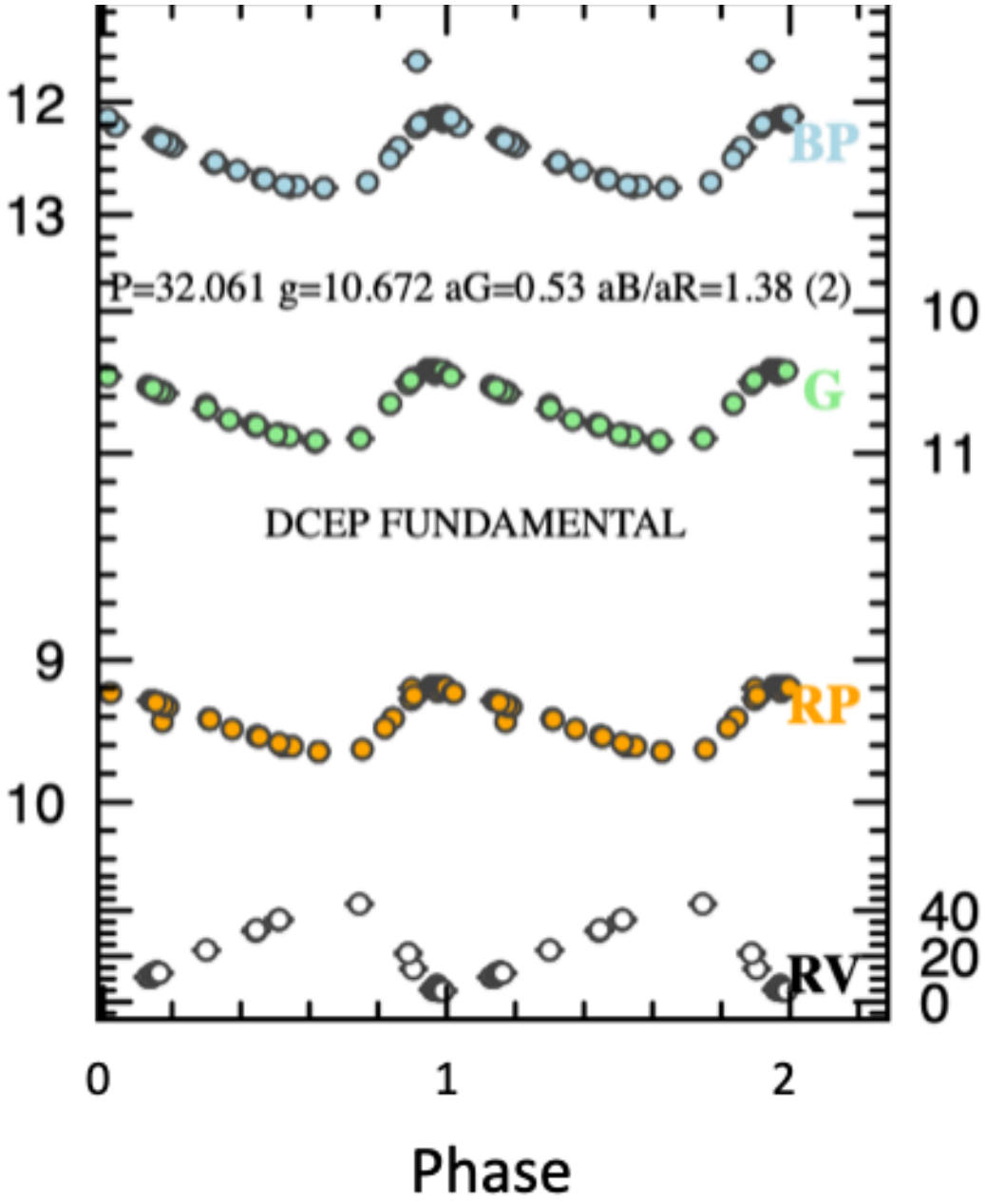
Lorenzo Rimoldini



Interesting to compare with
Thinh Nguyen Poster
@ this conference

Cepheids with BP, G, RP and RVS

Vincenzo Ripepi, Gisella Clementini, Roberto Molinaro, Silvio Leccia, Ilaria Musella, Alessia Garofalo, Tatiana Muraveva

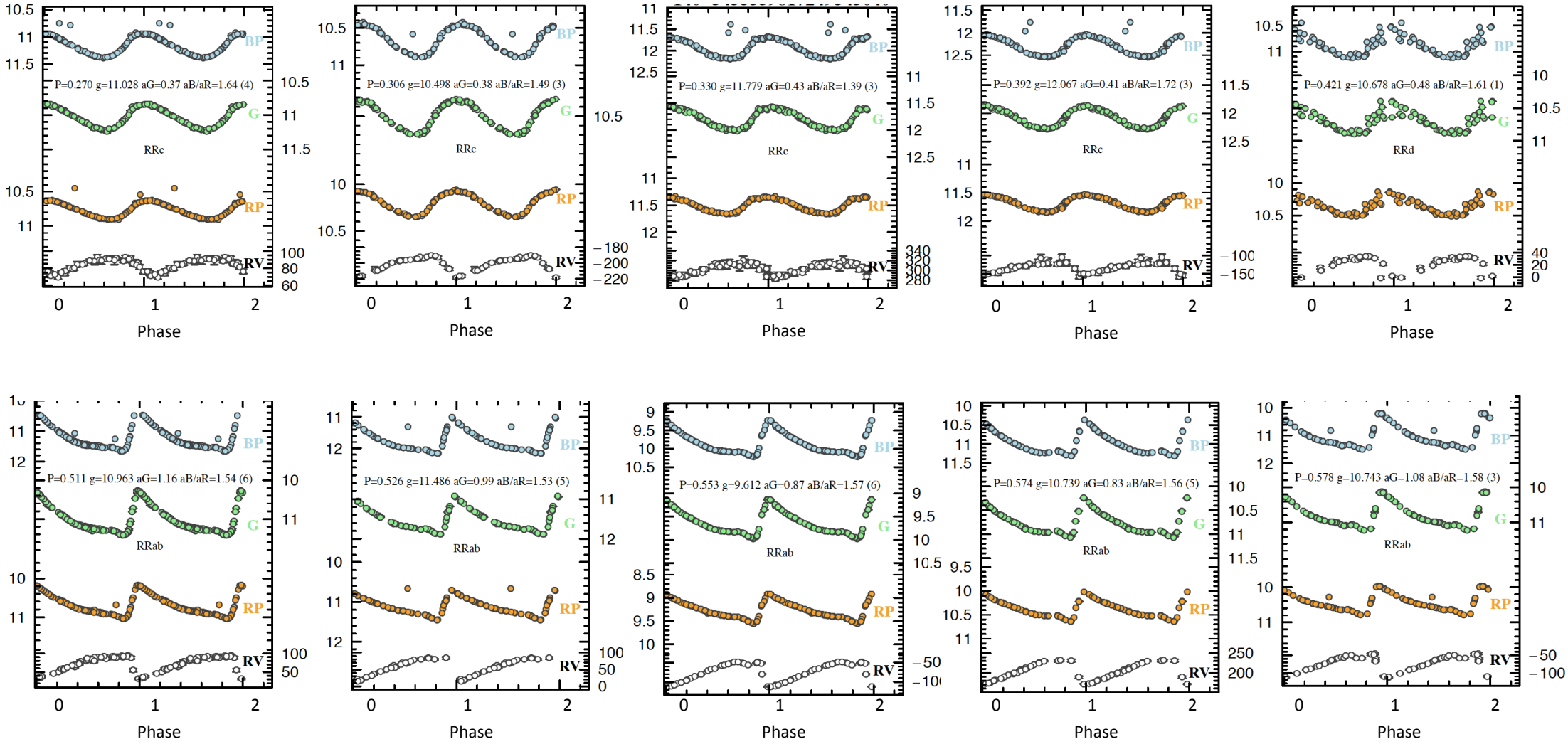


See
V. Ripepi's presentation
@ this conference

RR Lyrae stars

Gisella Clementini, Vincenzo Ripepi, Alessia Garofalo, Tatiana Muraveva, Roberto Molinaro, Silvio Leccia

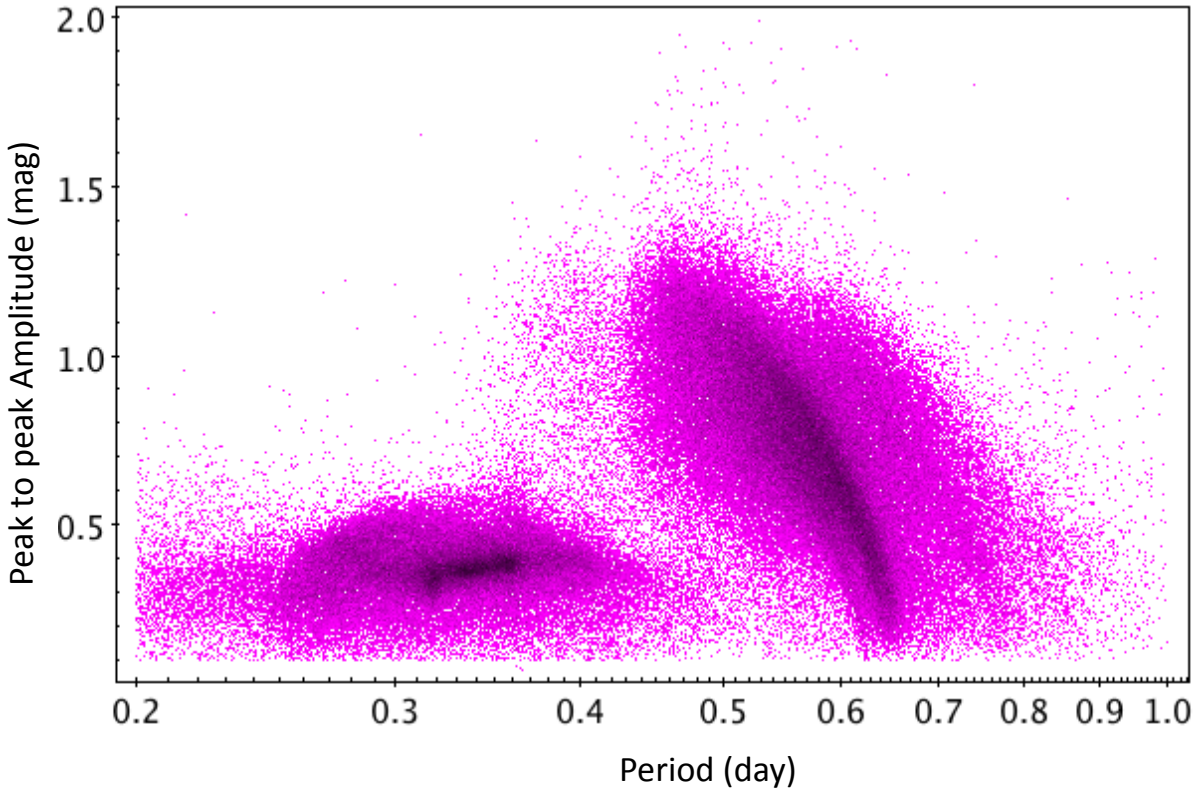
About 2,000 Cepheids and RR Lyrae stars with radial velocities



RR Lyrae stars

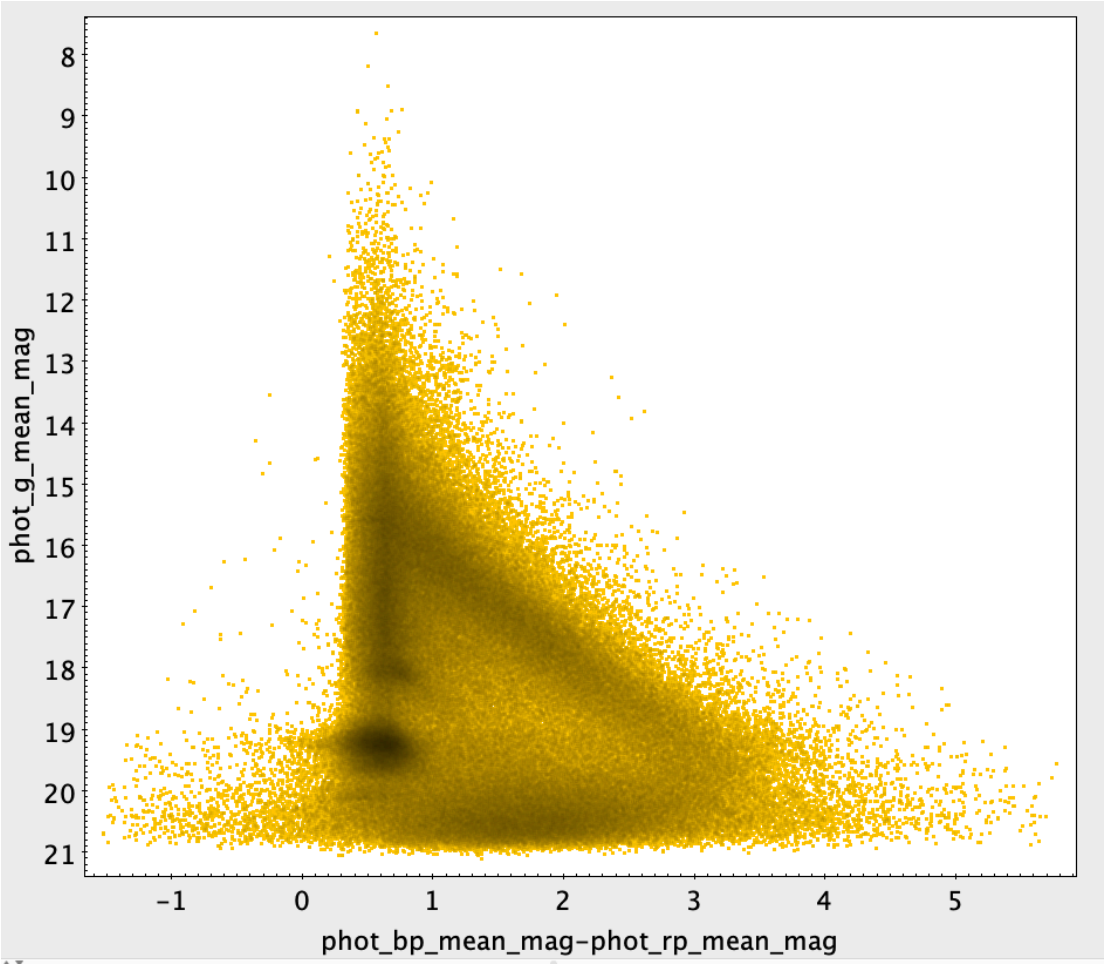
Gisella Clementini, Vincenzo Ripepi, Alessia Garofalo, Tatiana Muraveva, Roberto Molinaro, Silvio Leccia

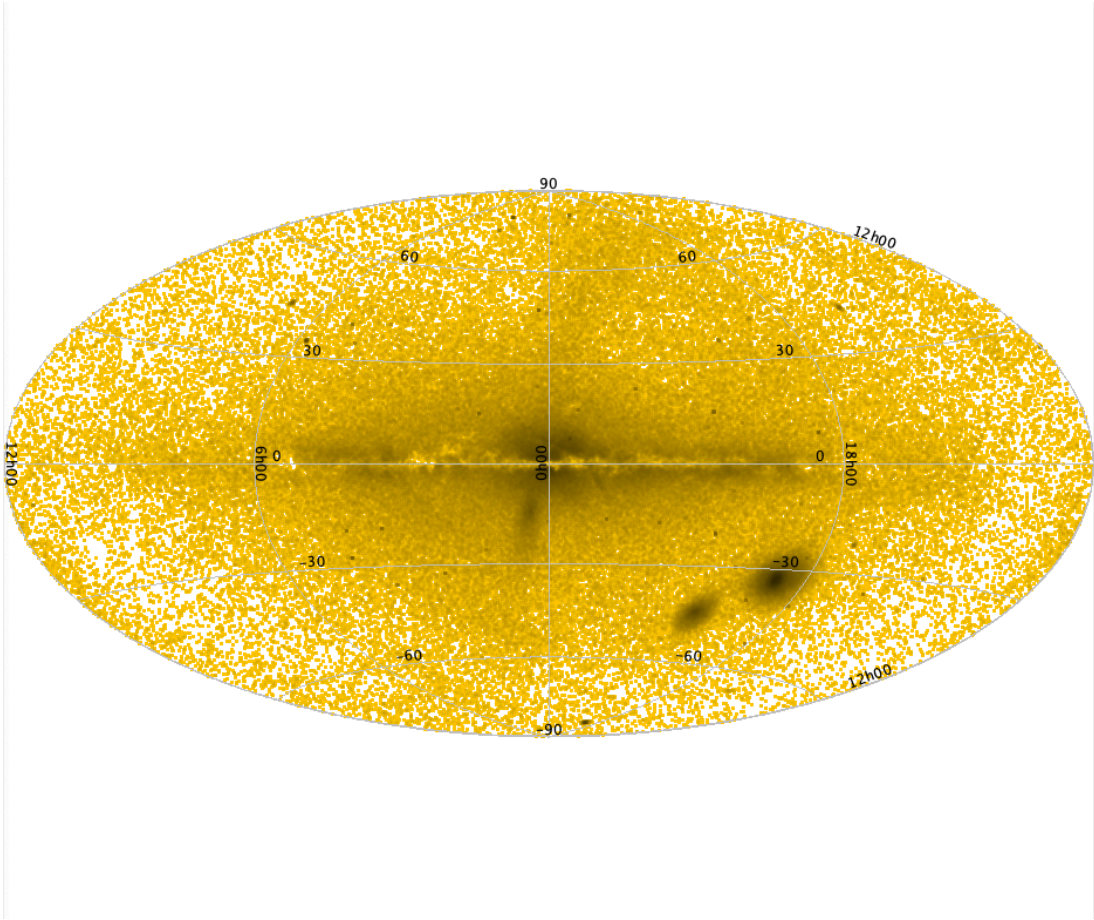
RR Lyrae stars: ~270,000 (with RVS time series for about 1,200)



Special focus on RR Lyrae stars

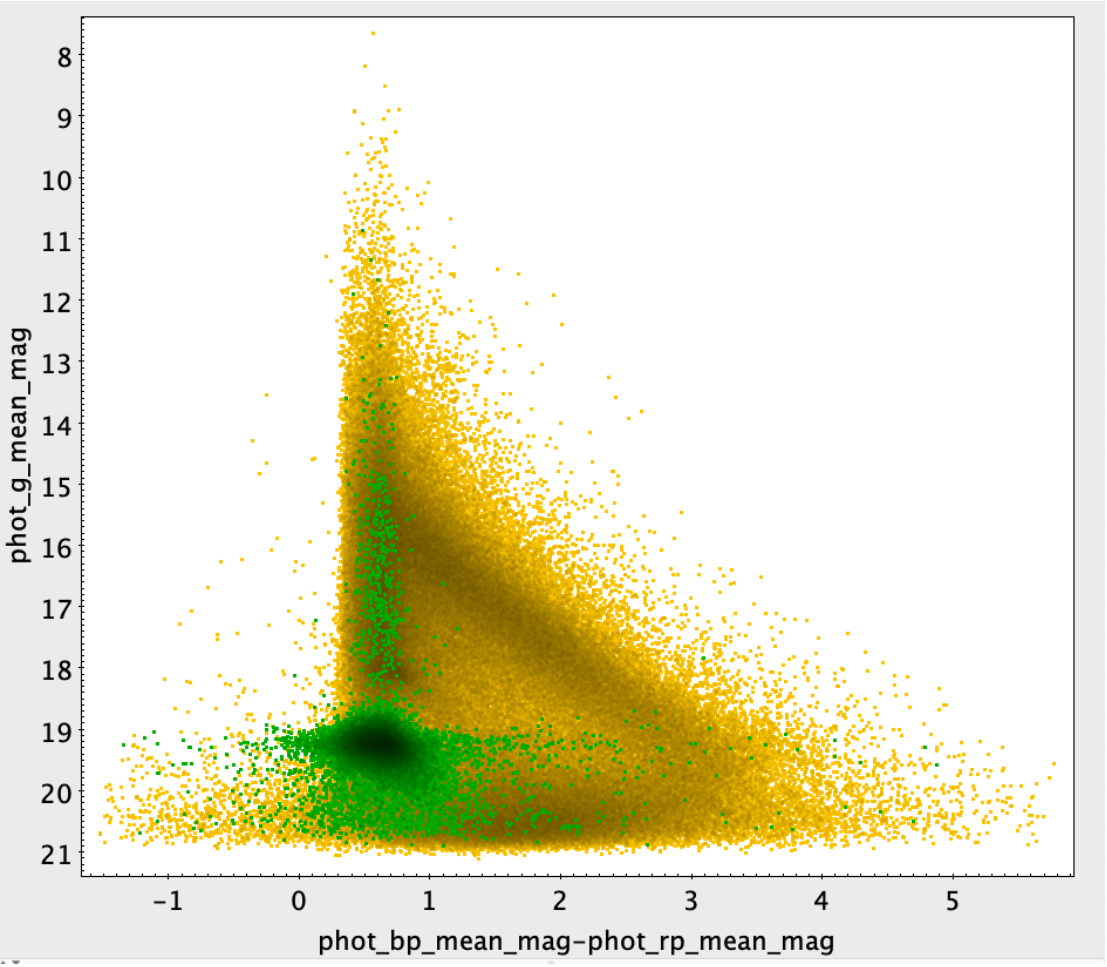
About 270,000 stars

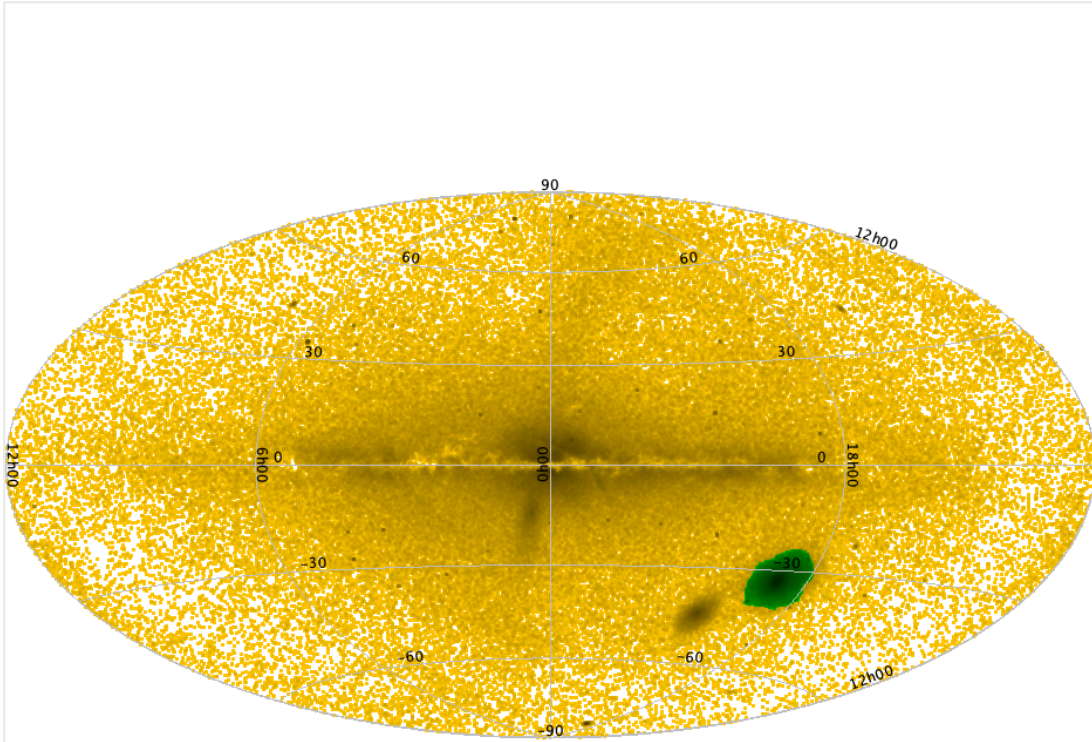




Special focus on RR Lyrae stars

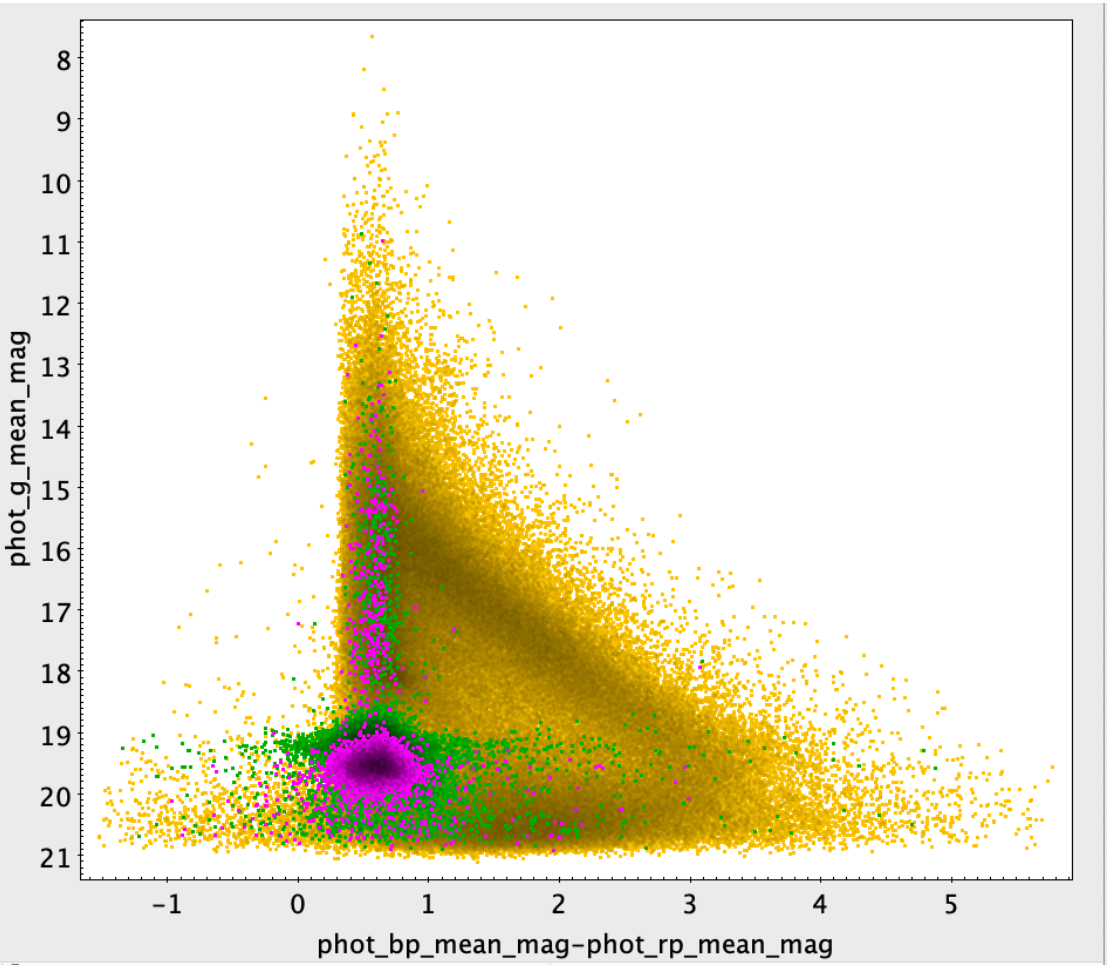
LMC

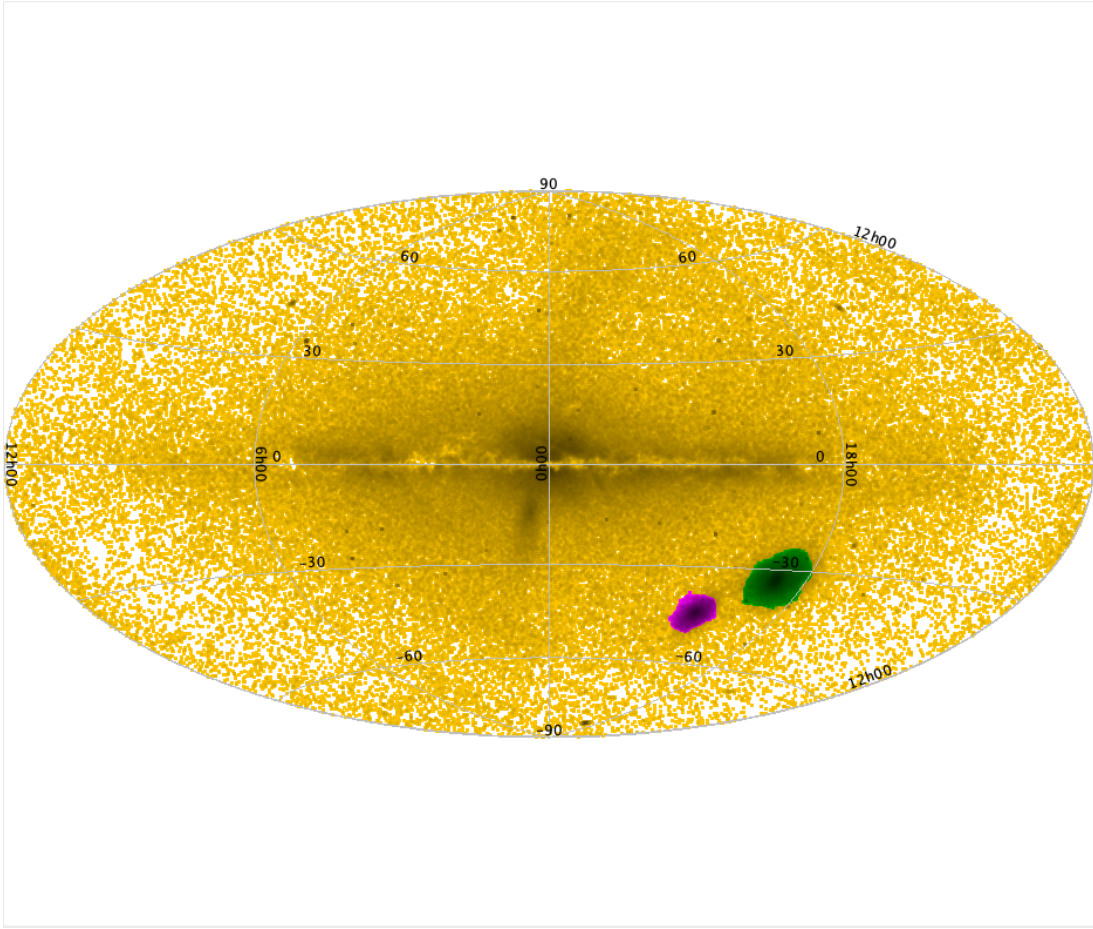




Special focus on RR Lyrae stars

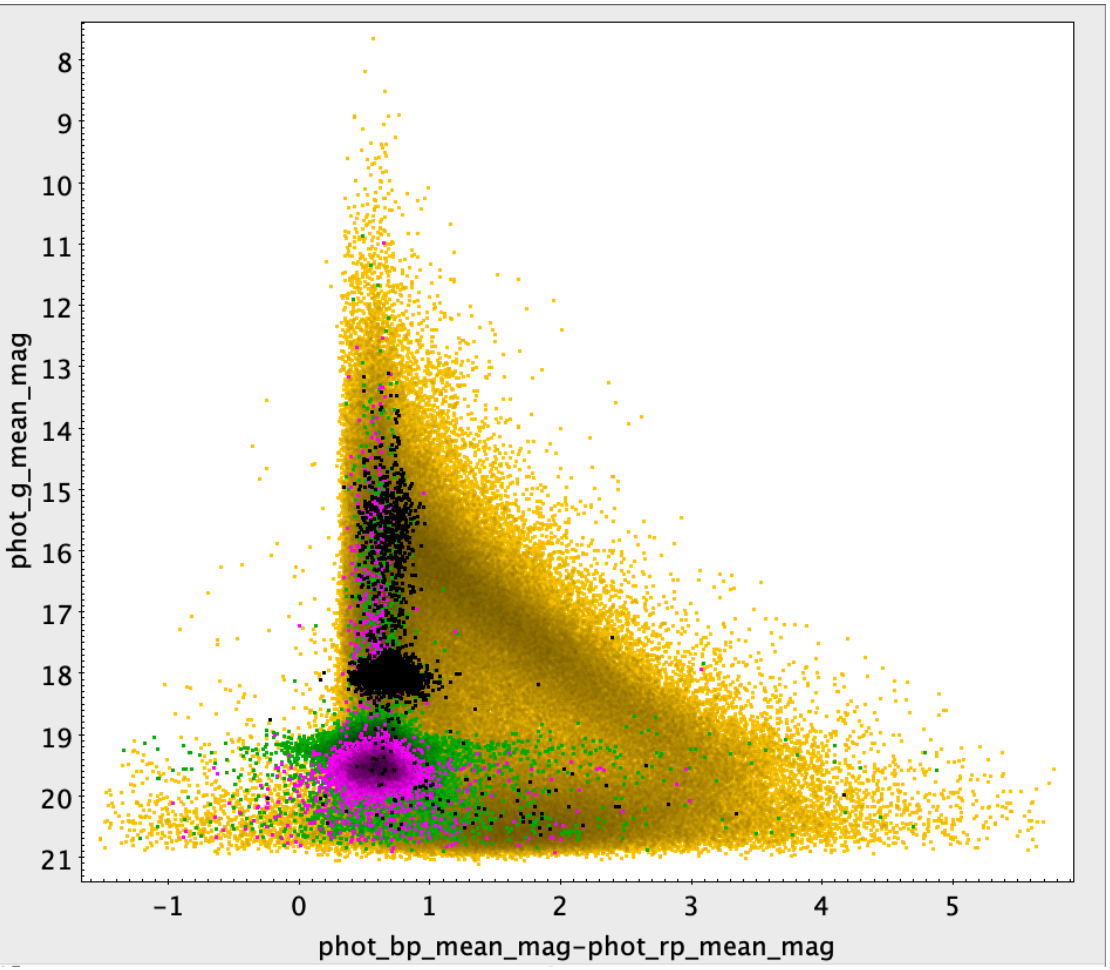
SMC

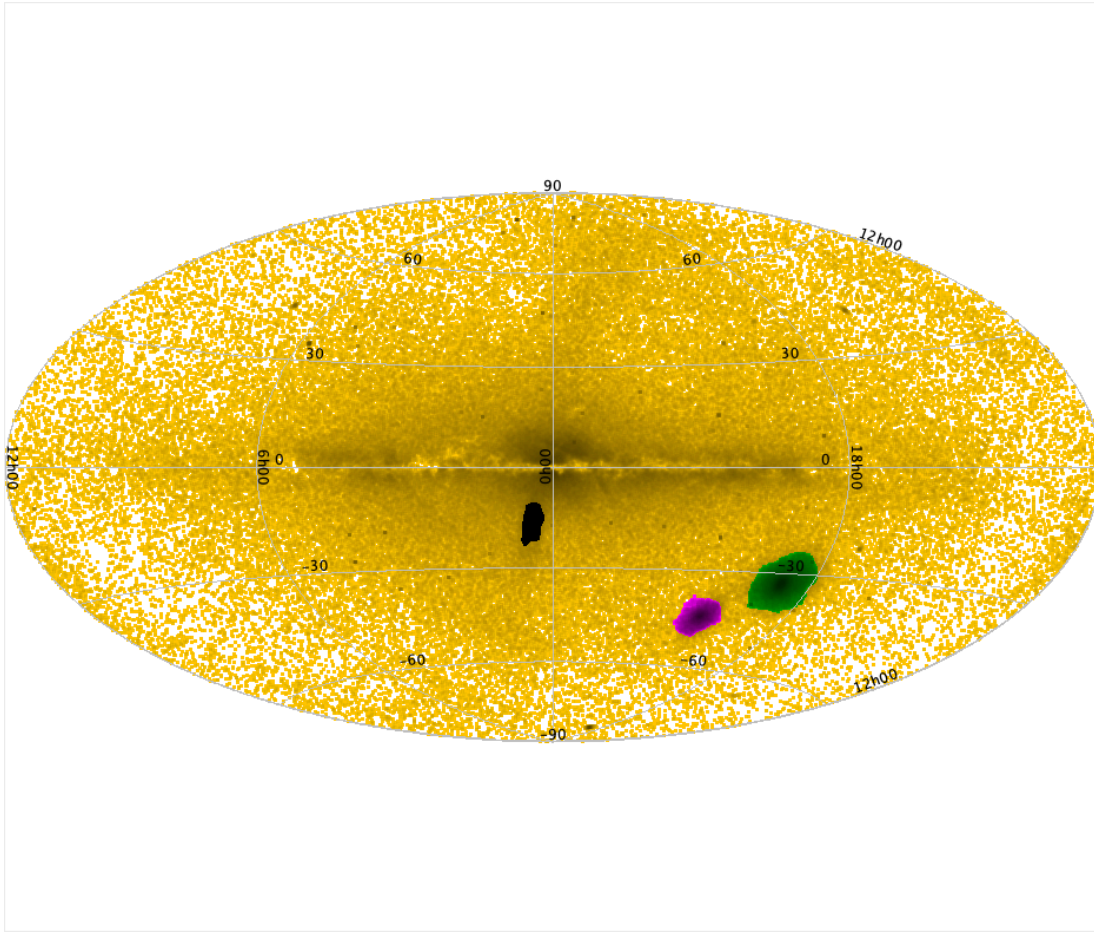




Special focus on RR Lyrae stars

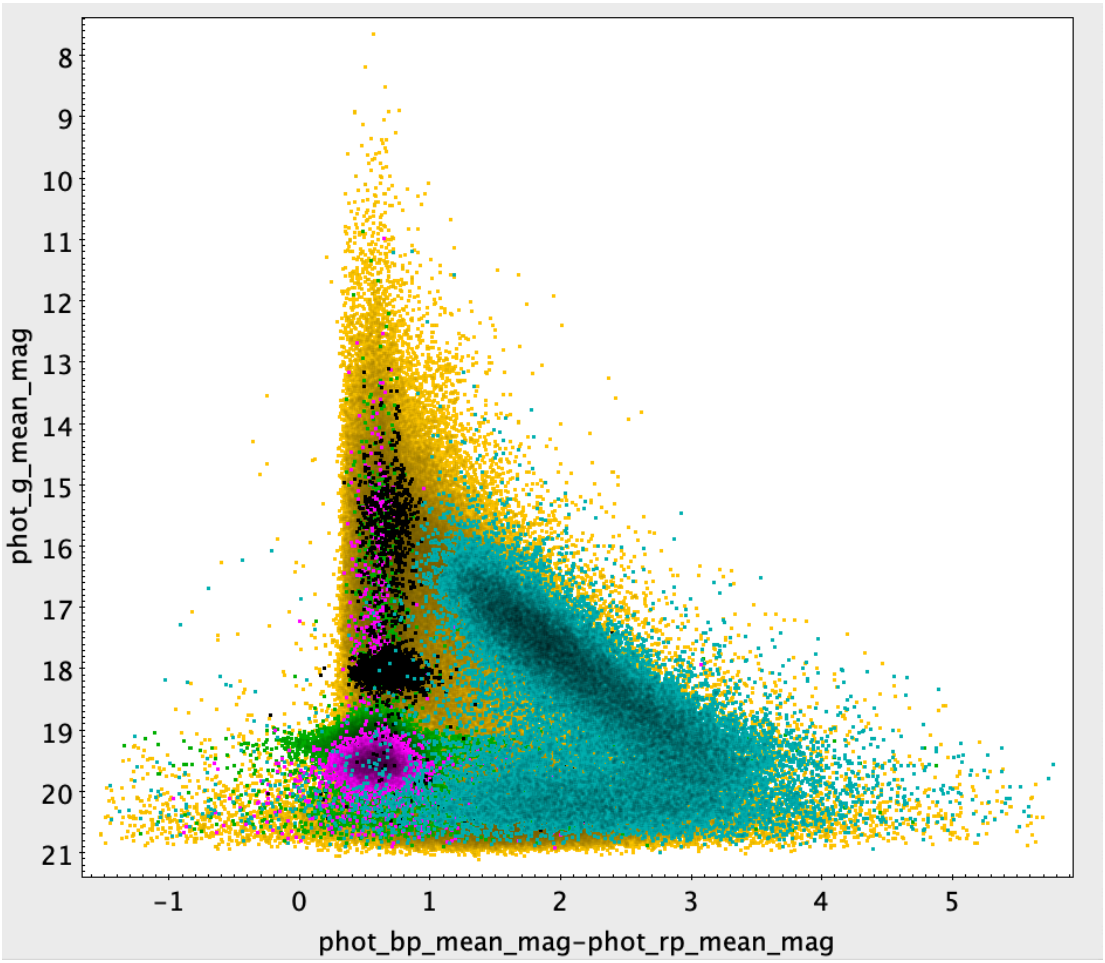
Sagittarius Dwarf

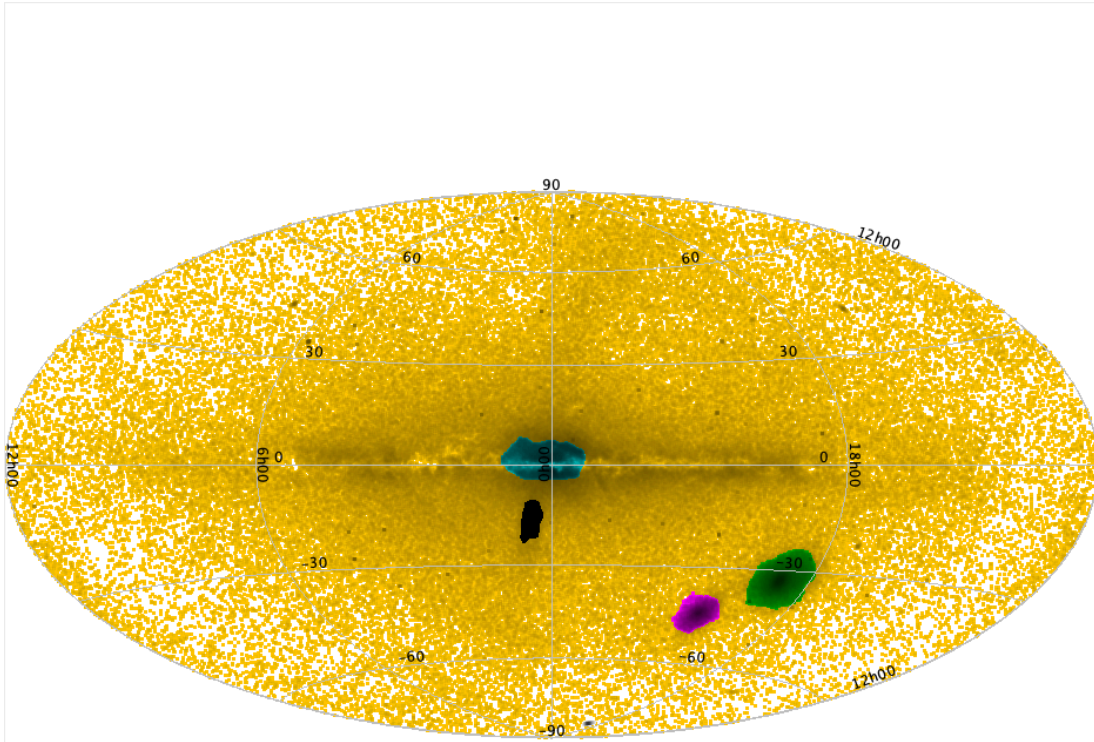




Special focus on RR Lyrae stars

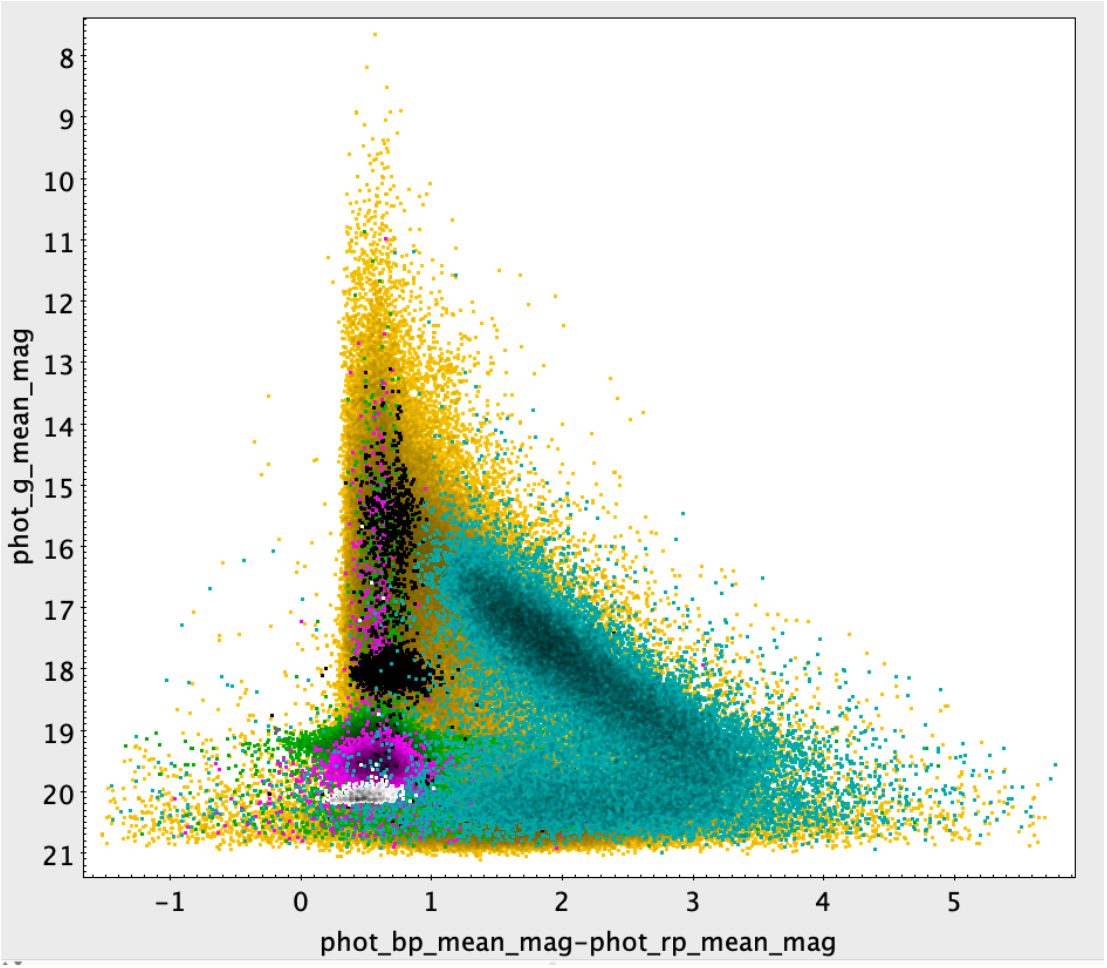
Bulge (with strong extinction)

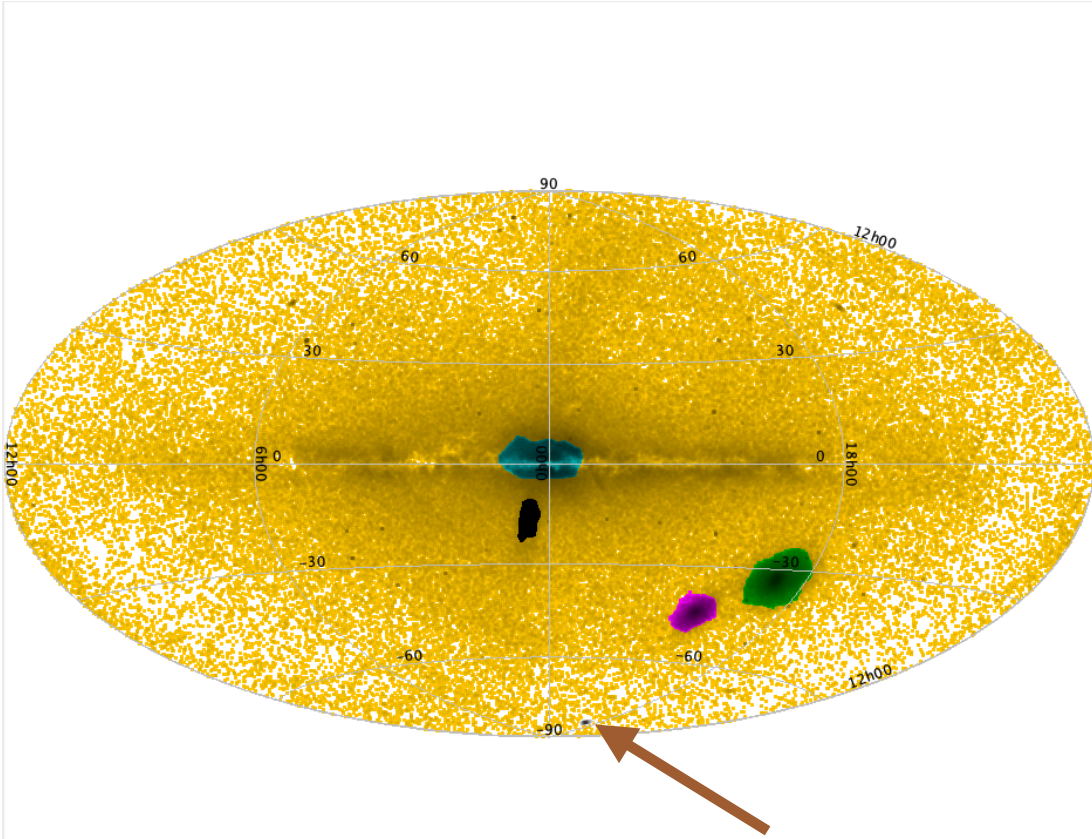


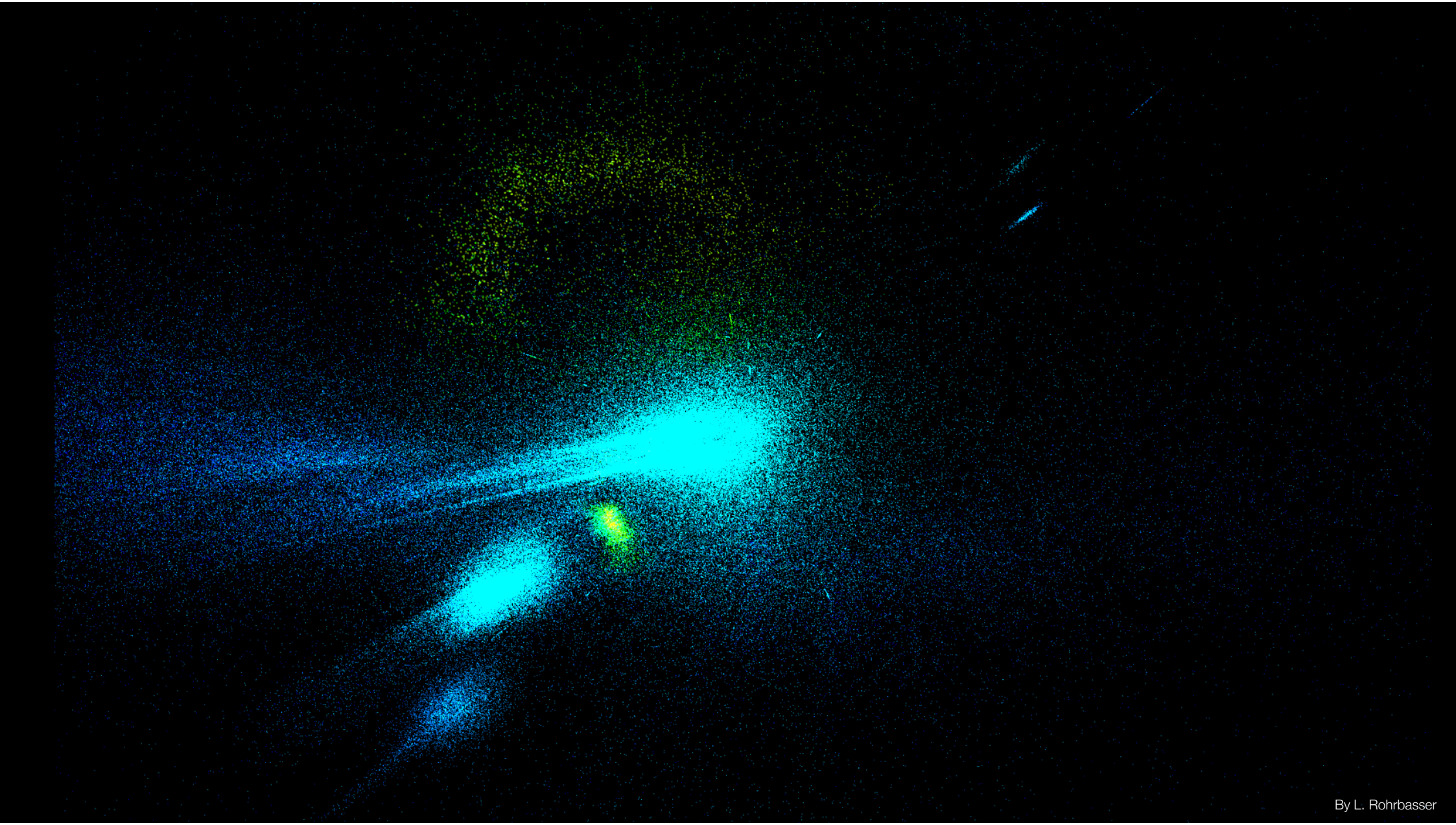


Special focus on RR Lyrae stars

Sculptor






By L. Rohrbasser

Conclusion