

Microlensing Highlights in Gaia Science Alerts

Katarzyna Kruszyńska,

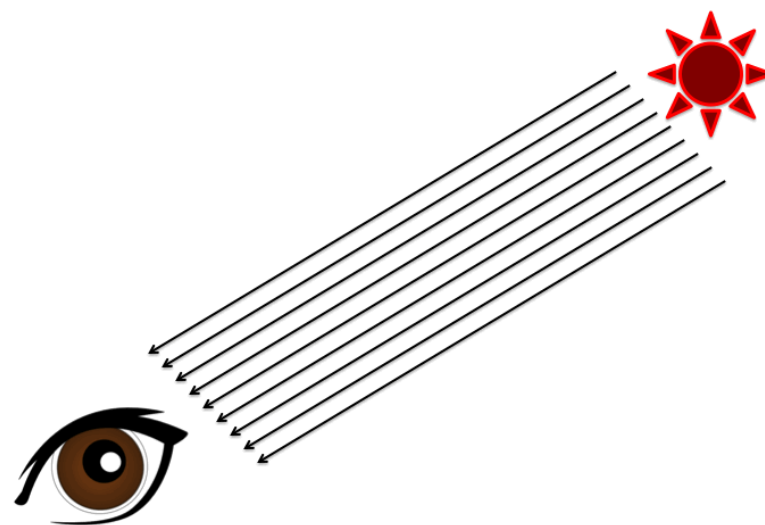
Ł. Wyrzykowski, K. Rybicki, P. Zieliński, I. Gezer, N. Ihanec et al.

Astronomical Observatory, University of Warsaw

11th Gaia Science Alerts Workshop, 2021

Gravitational Microlensing

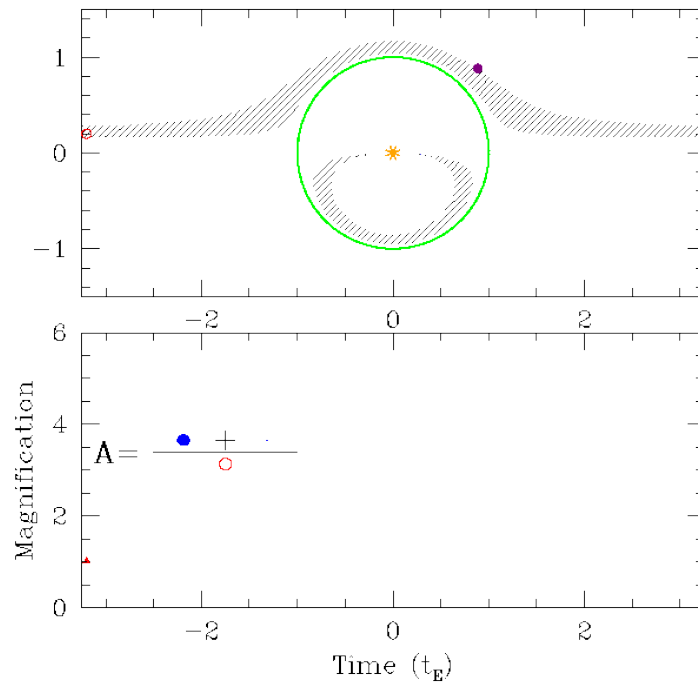
- Change in brightness of a background source star due to gravitational field bending light by a foreground lens
- Can detect massive objects which don't emit light*:
 - Planets, white dwarfs, neutron stars, **black holes**
- Can be used to study the structure of the Milky Way (optical depth for microlensing)



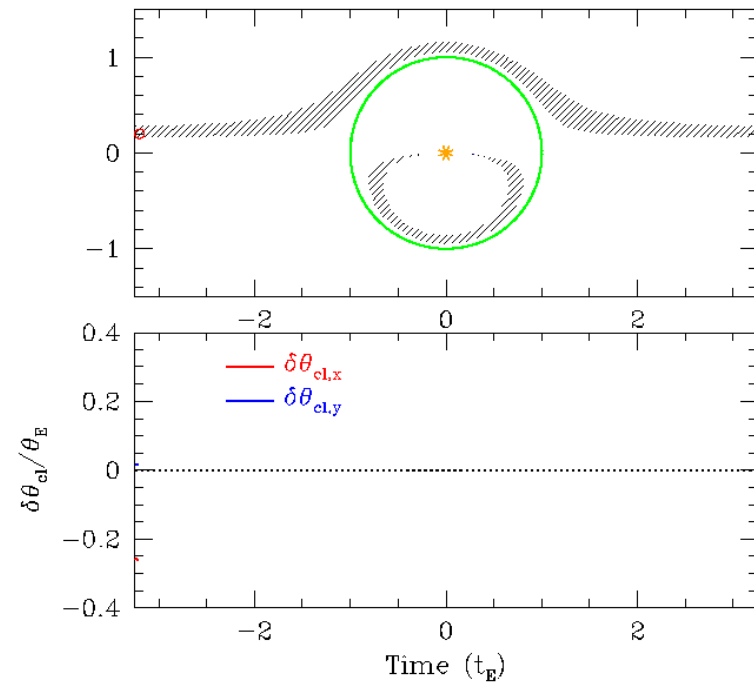
Author: J. Yee

Gravitational Microlensing

Photometric



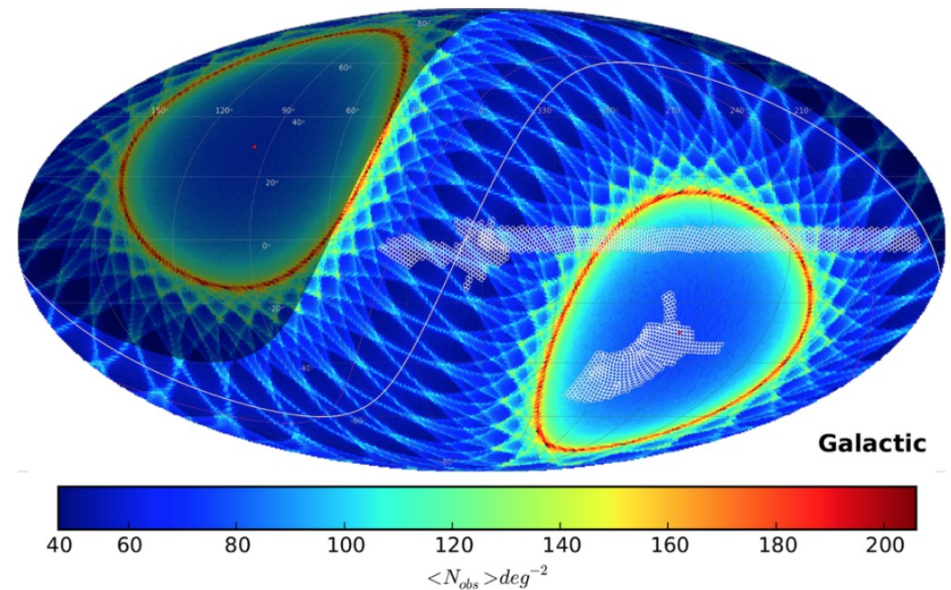
Astrometric



Animations by S.
Gaudi

Microlensing and Gaia

- Gaia has low cadance (on average 1 point/30 days)
 - Very low cadance in bulge :(
- But it is observing the entire Milky Way
- Astrometric Mission!
- Possible detection of astrometric microlensing for multiple events!

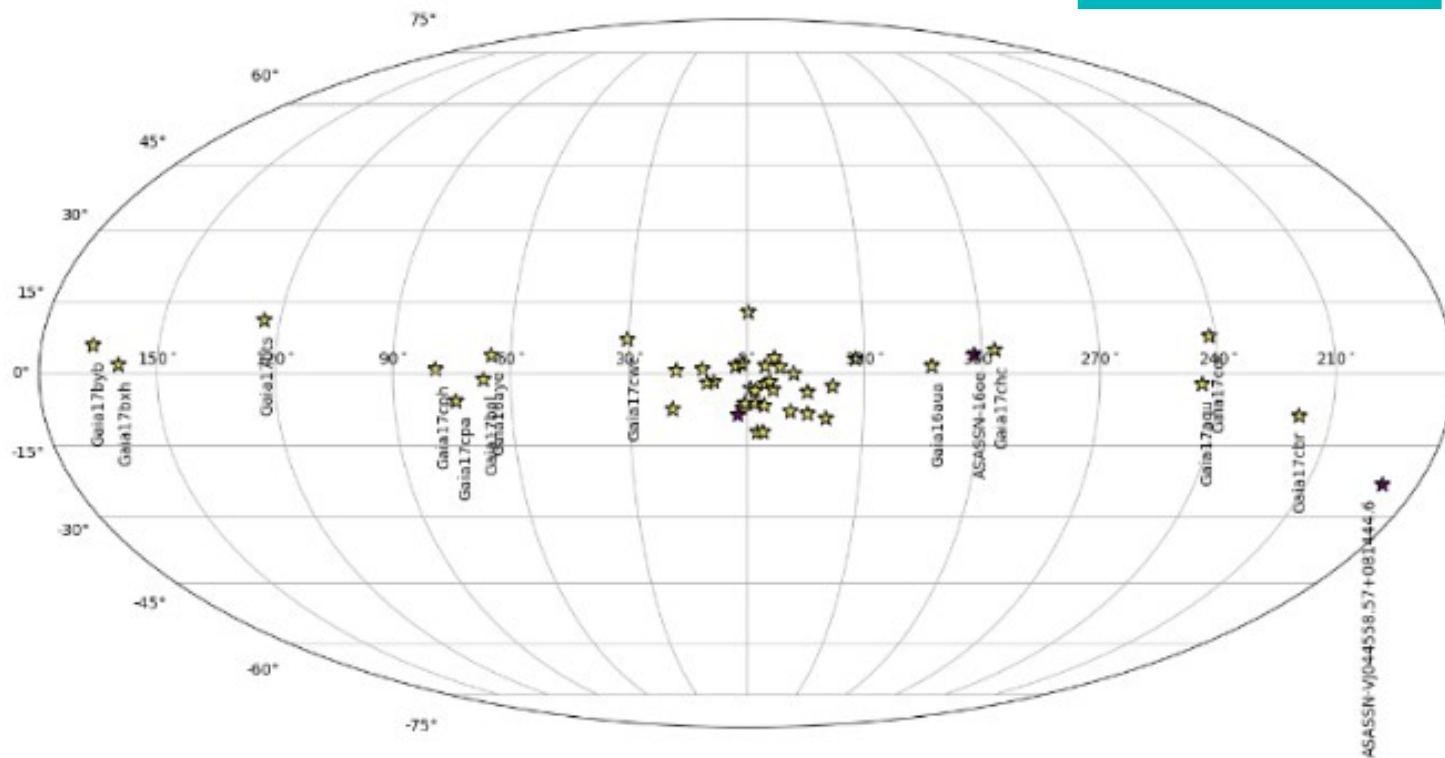


Gaia Scanning Law
after 5 years of Nominal mission

Image by N. Blagorodnova

Microlensing in Gaia Science Alerts over the years

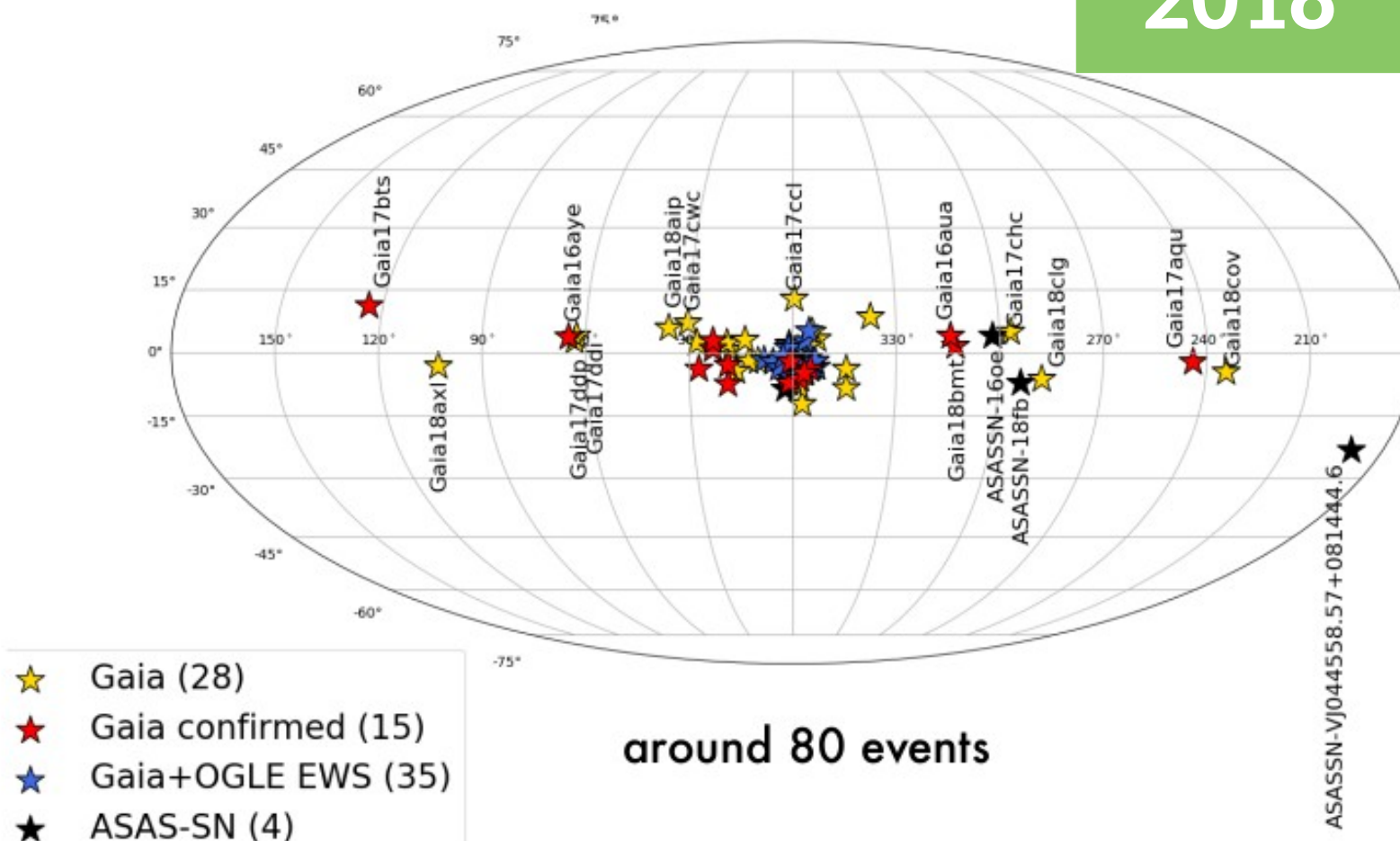
2017



around 30 events

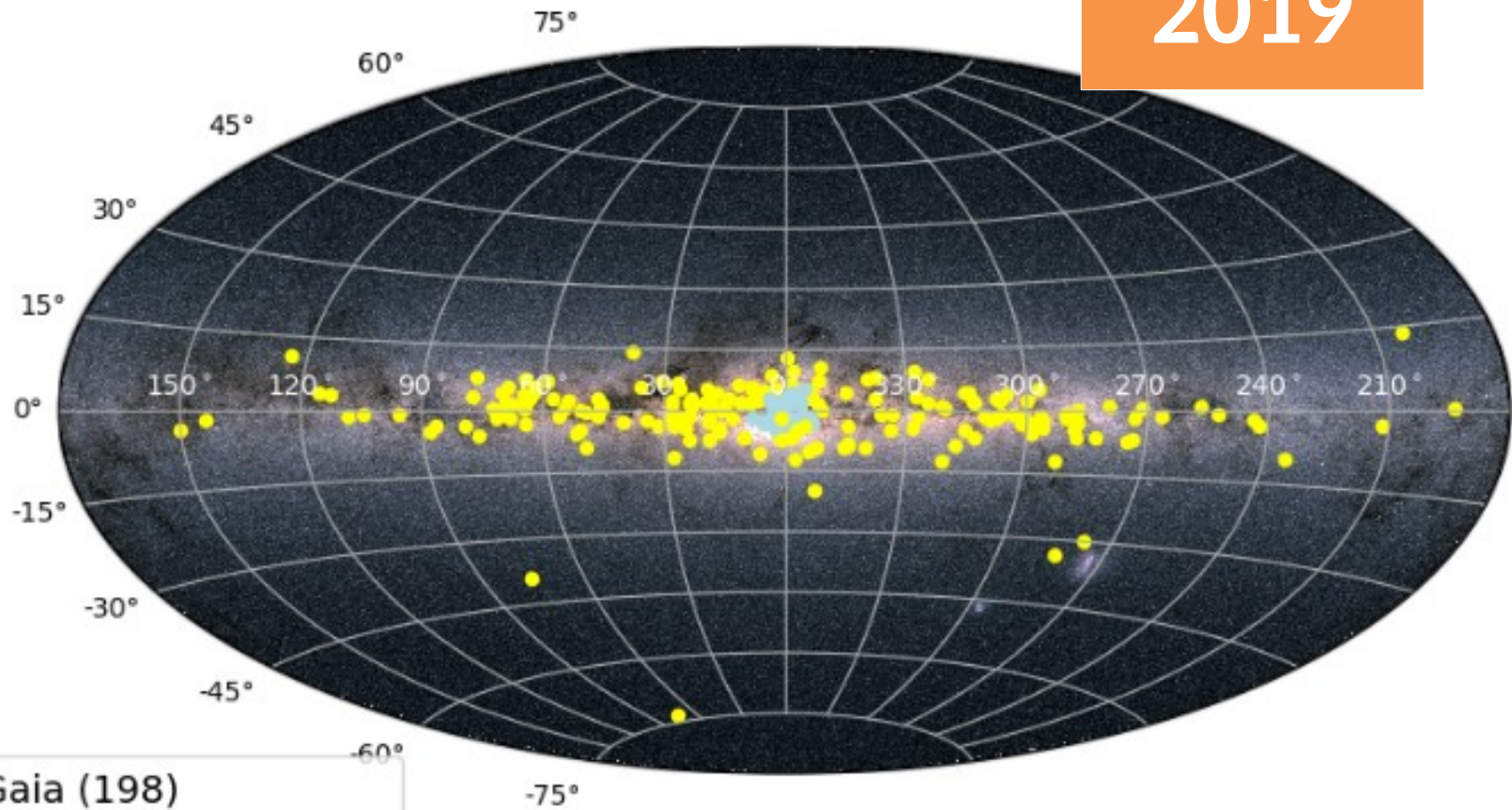
Microlensing in Gaia Science Alerts over the years

2018



Microlensing in Gaia Science Alerts over the years

2019



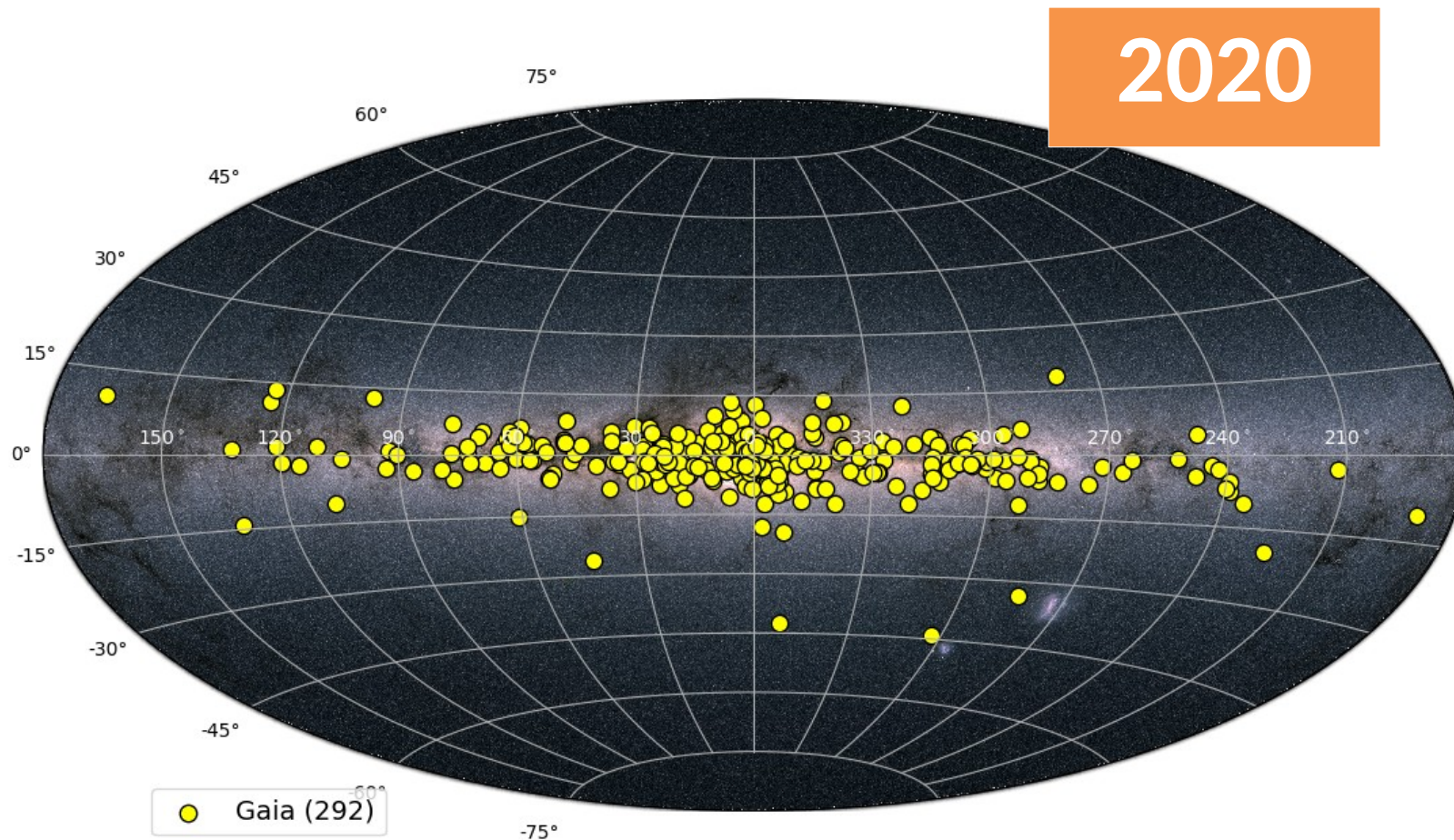
- Gaia (198)
- Gaia+OGLE EWS (65)

around 260 events!!

Nov 2019

Background image: ESA/DPAC

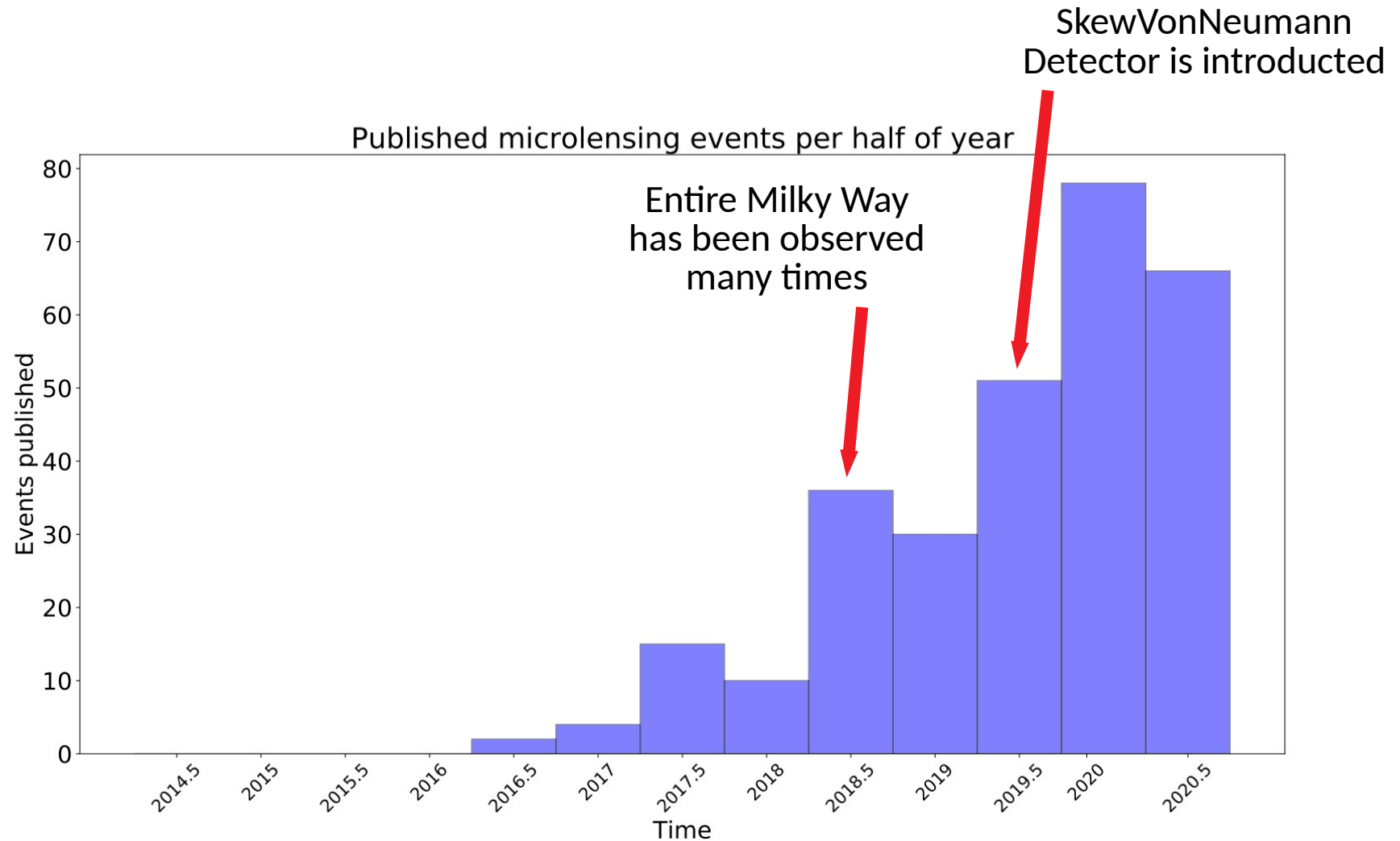
Microlensing in Gaia Science Alerts over the years



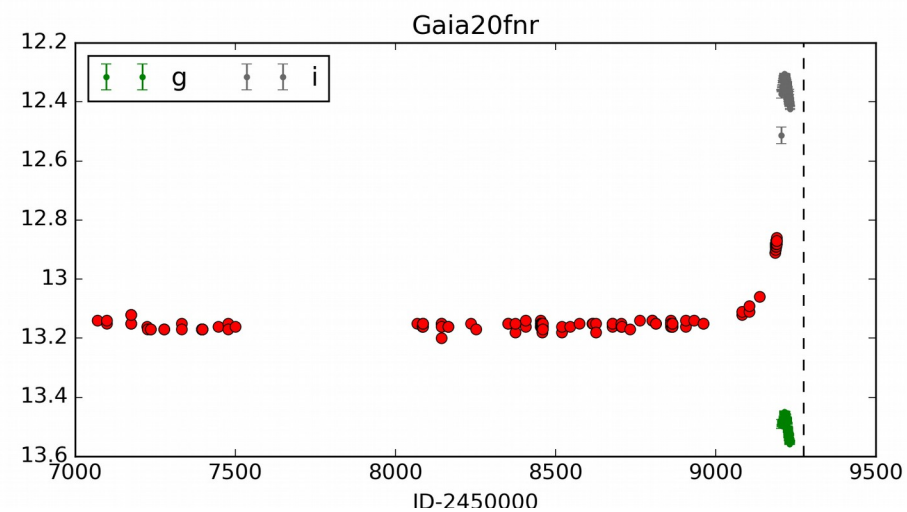
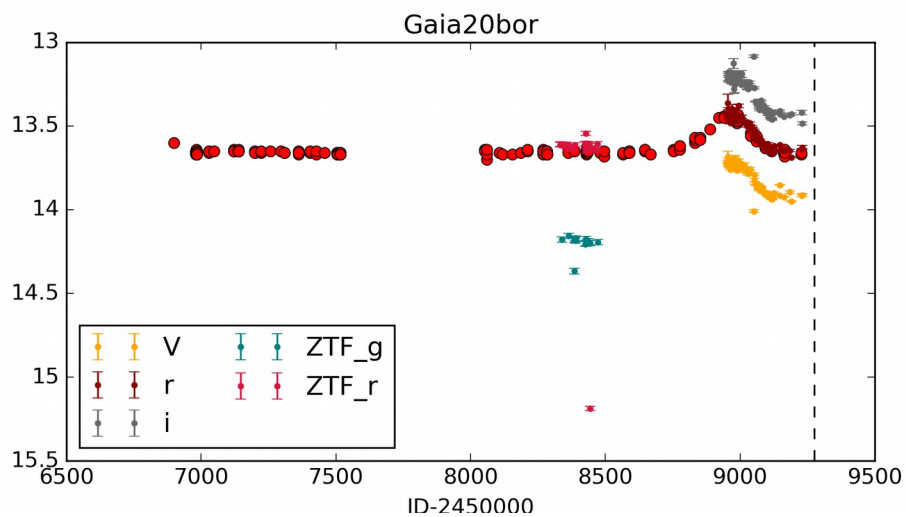
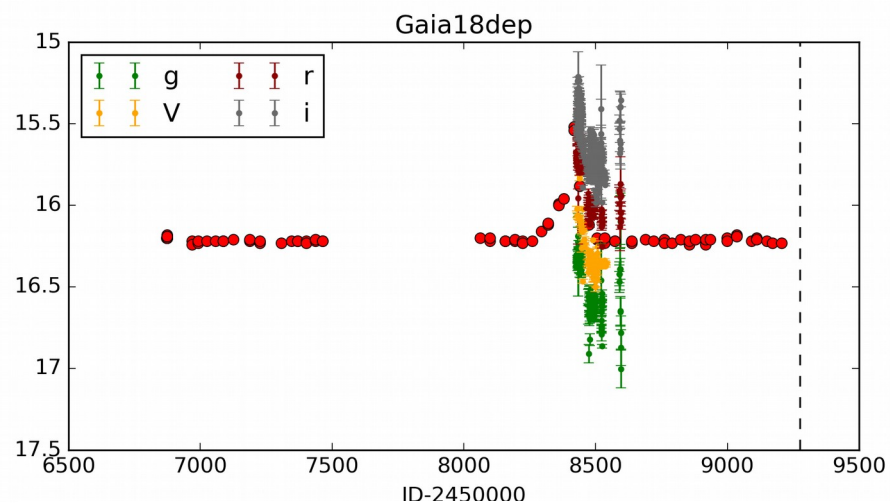
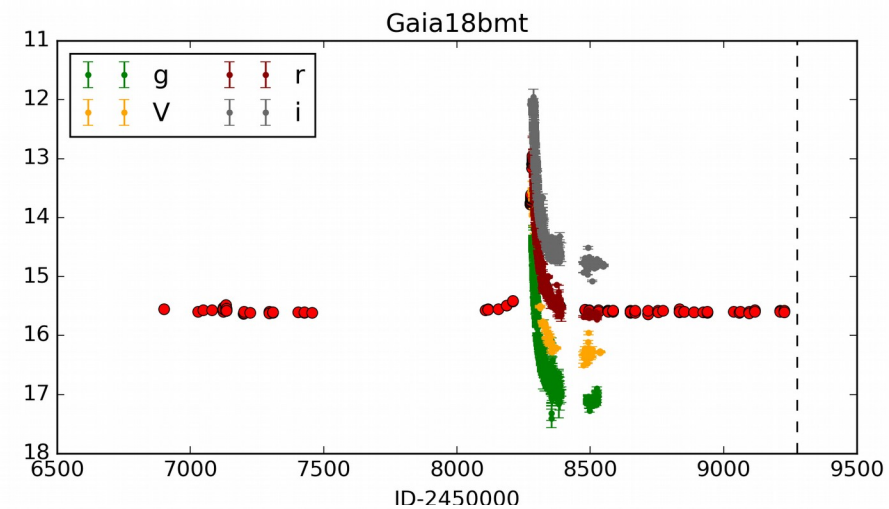
Background image: ESA/DPAC

Almost 300 events

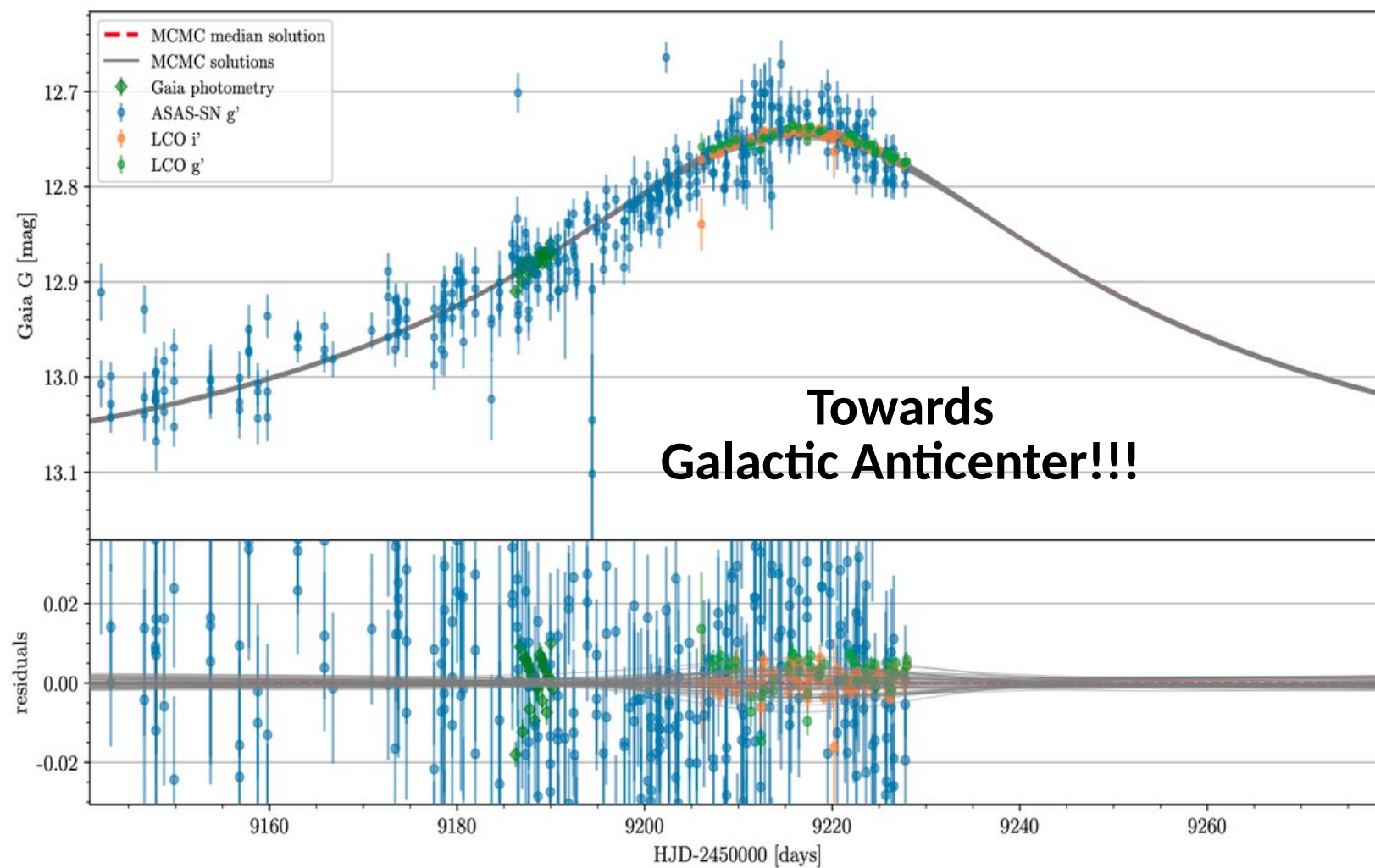
Microlensing in Gaia Science Alerts over the years



Highlights

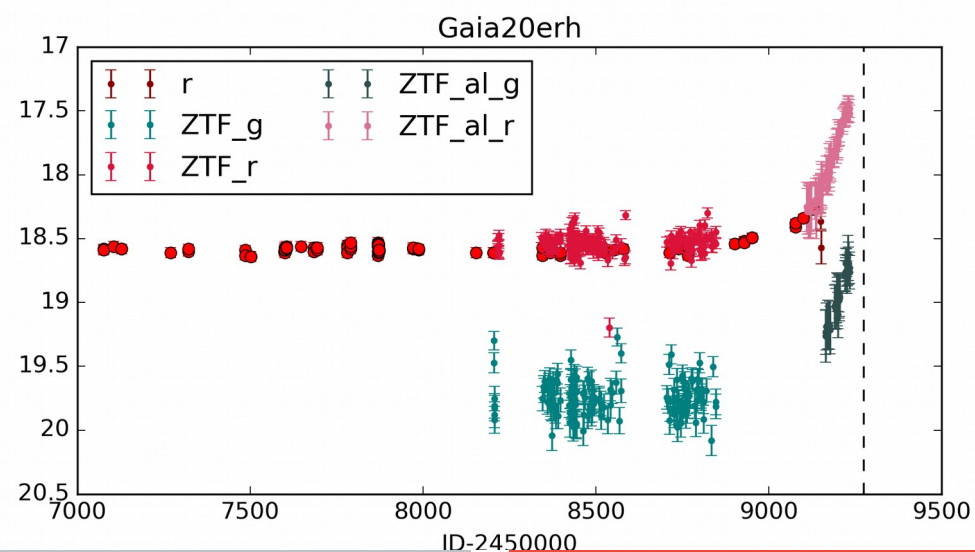
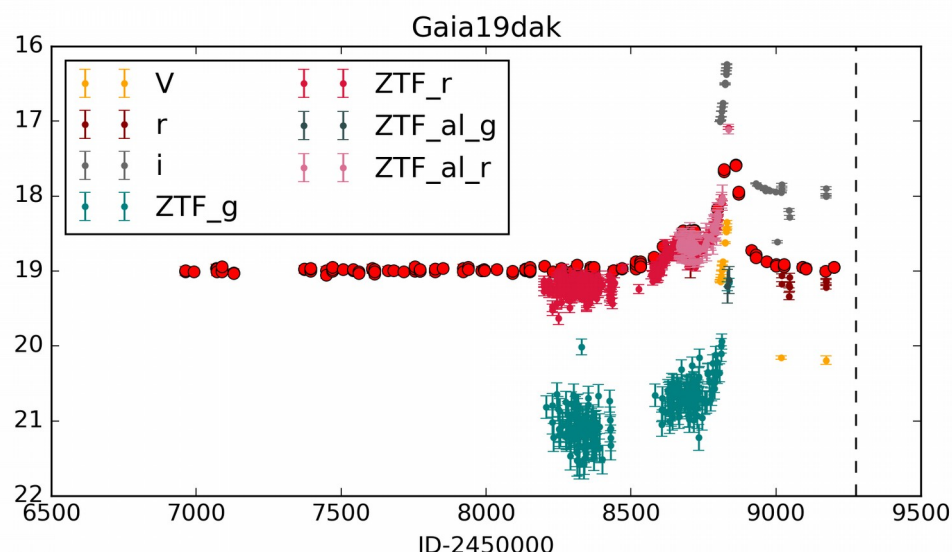
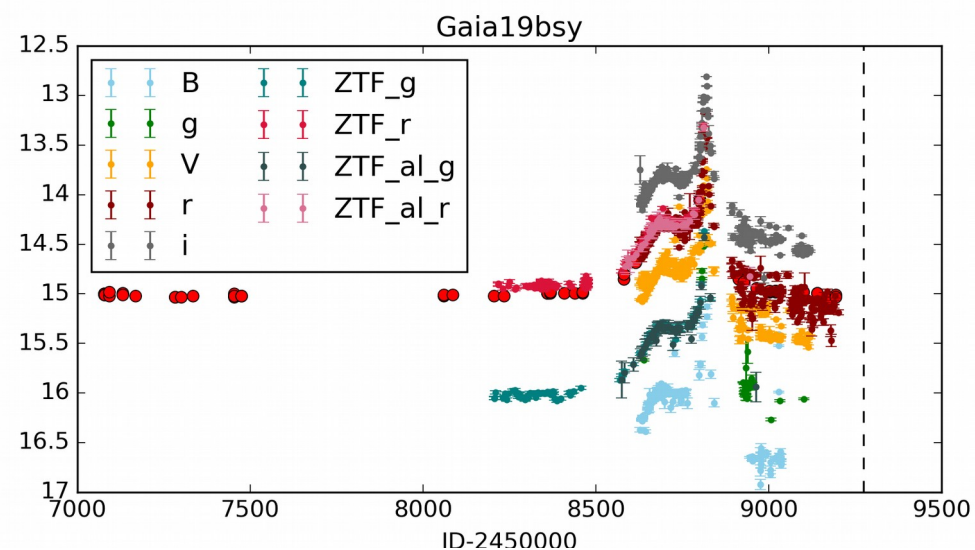
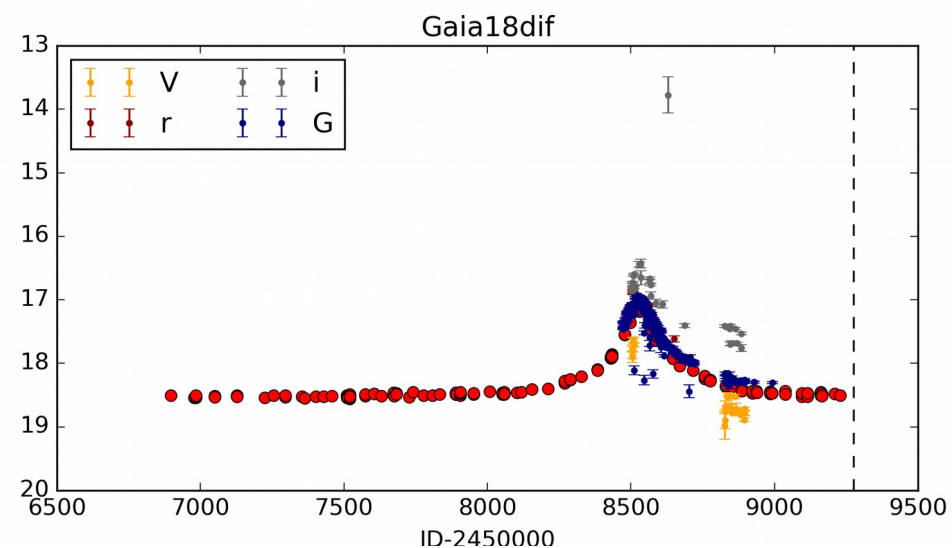


Highlights



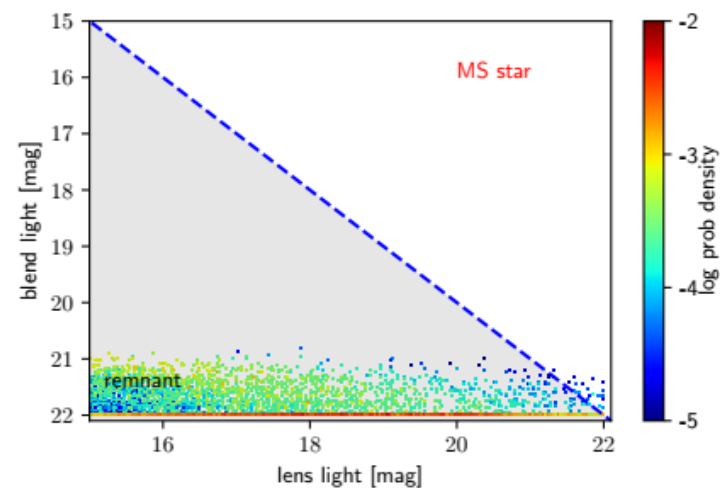
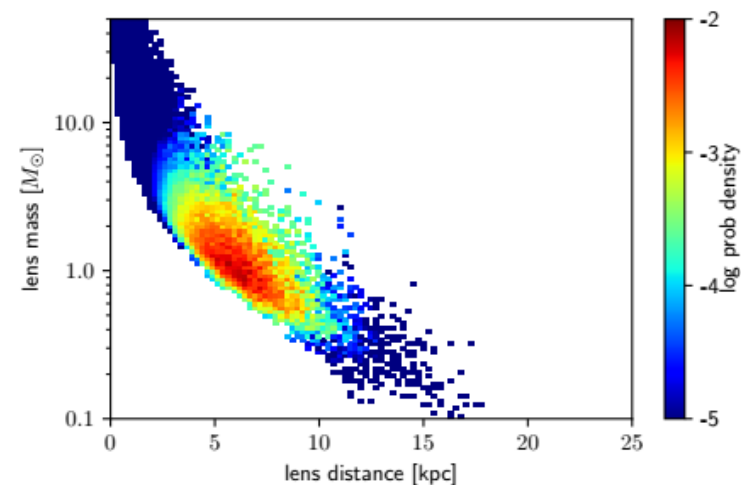
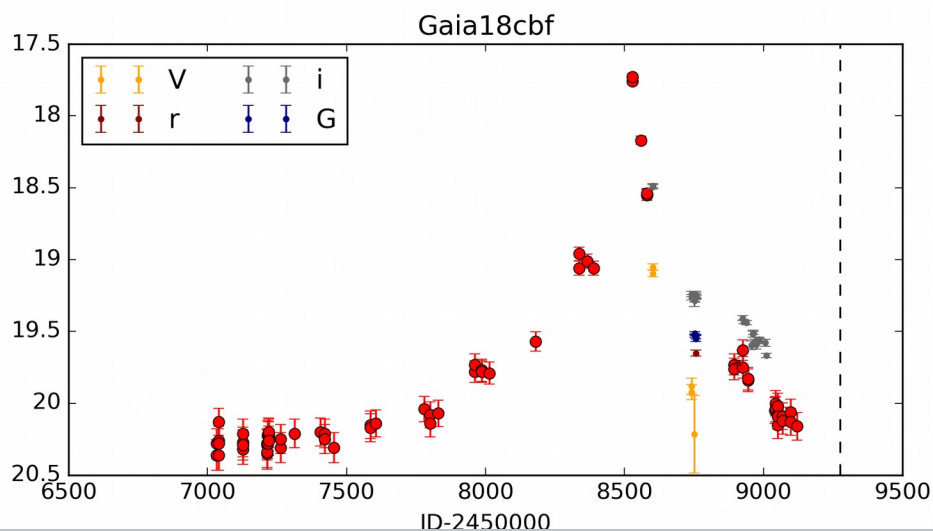
Model by K. Rybicki

Long Microlensing Events



Gaia18cbf

- Extremely long microlensing events
- Two solutions yield:
 - $U0 > 0$: $tE = 557.7d$, $f_s = 0.82$
 - $U0 < 0$: $tE = 464.9d$, $f_s = 0.72$



Summary

- Gaia Science Alerts publishes microlensing events from entire Milky Way
- Gaia will provide submilliarcsecond astrometry for each alert!
- Detection of microlensing events still improves!
- Follow-up is vital and welcome!!!
- Long events!!!

**THANK YOU
FOR YOUR CONTRIBUTION!**



Most Common Contaminants

