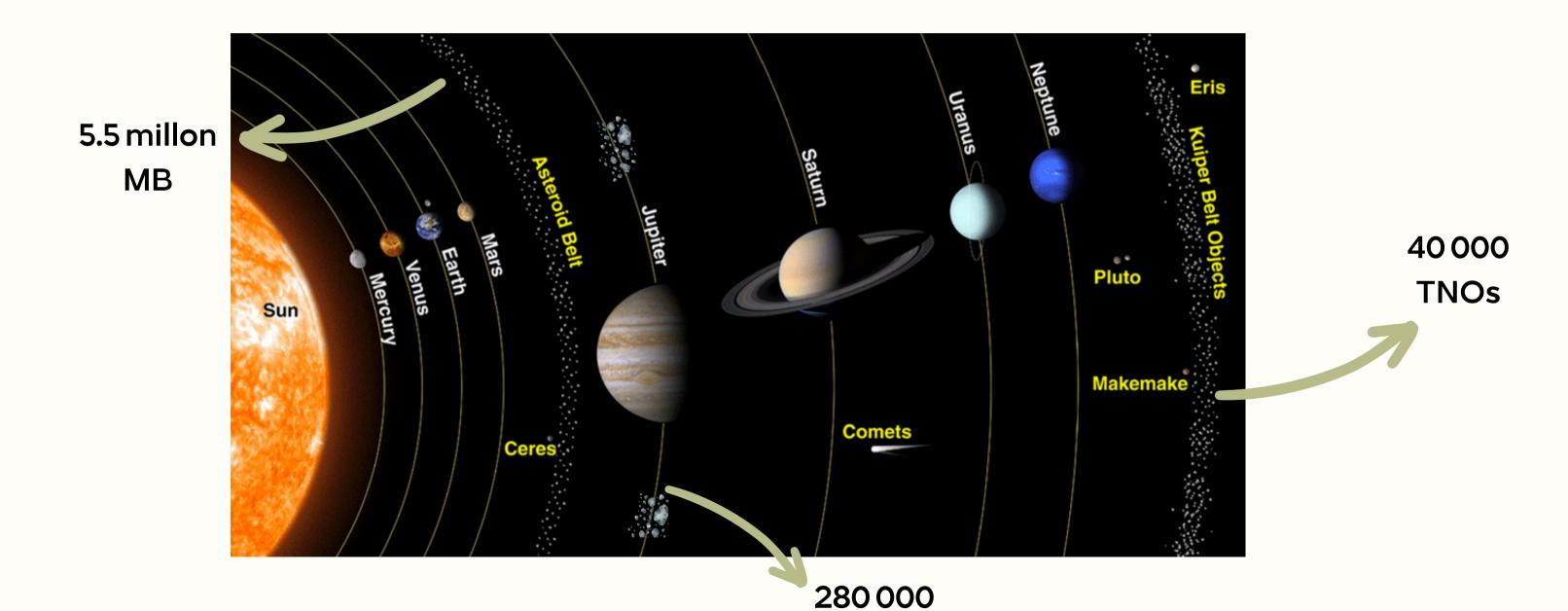
Colazo Milagros

Astronomical Observatory Institute, Faculty of Physics and Astronomy, A. Mickiewicz University,

Developing algorithms for Phase Curve analysis USING DP03 SINULATED DATA in the LSST era

milcol@amu.edu.pl

The Vera C. Rubin Observatory Legacy Survey of Space and Time (LSST) will discover 6 million solar system planetesimals, providing over a billion photometric and astrometric measurements in 6 broad-band filters (Schwamb et al., 2021).



JT

The Data Previews

simulated data generated by the Dark Energy Science Collaboration

DP0.2

simulated LSST-lik data products containing extragalactic and galactic objects.

onlycontains simulated Solar System objects, and is completely independent of the simulated DP0.2.

DiaSource

Astrometric and photometric measurements

2-d(sky) coordinates and 3-d distances andvelocities

We have all the information in <u>one</u> place!!

DP0.3

SSSource

MPCORB

MPC-style information for injected solar system objects

SSObject

Measured properties such as absolute magnitudes

The Data Products

Rubin Data Product Categories



Prompt Data Products

Real Time Difference Image Analysis (DIA)

- A stream of ~10 million time-domain events per night (Alerts), transmitted to event distribution networks within 60s of camera readour.
- Images, Object and Source catalogs derived from DIA, and an orbit catalog for ~6 million Solar System bodies within 24h.
- Enables discovery and rapid follow-up of time domain events



Reduced single-epoch & deep co-added images, catalogs, reprocessed DIA products

- Catalogs of ~37 billion objects (20 billion galaxies, 17 billion stars), ~7 trillion sources and ~30 trillion forced source measurements.
- 11 Data Releases, produced ~annually over 10 years of operation



User Generated Data Products

User-produced derived, added-value data products

- Deep KBO/NEO, variable star classifications, shear maps, etc ...
- Enabled by services & computing resources at the LSST DACs and via the LSST Science Platform (LSP).
- 10% of LSST computing resources will be allocated for User Generated data product storage & processing.



Data Release Data Products

Accessible via LSST Science Platform & LSST Data Access Centers.

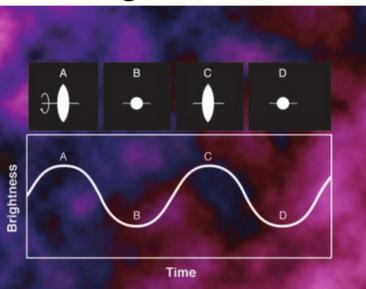
Data Release End 2026

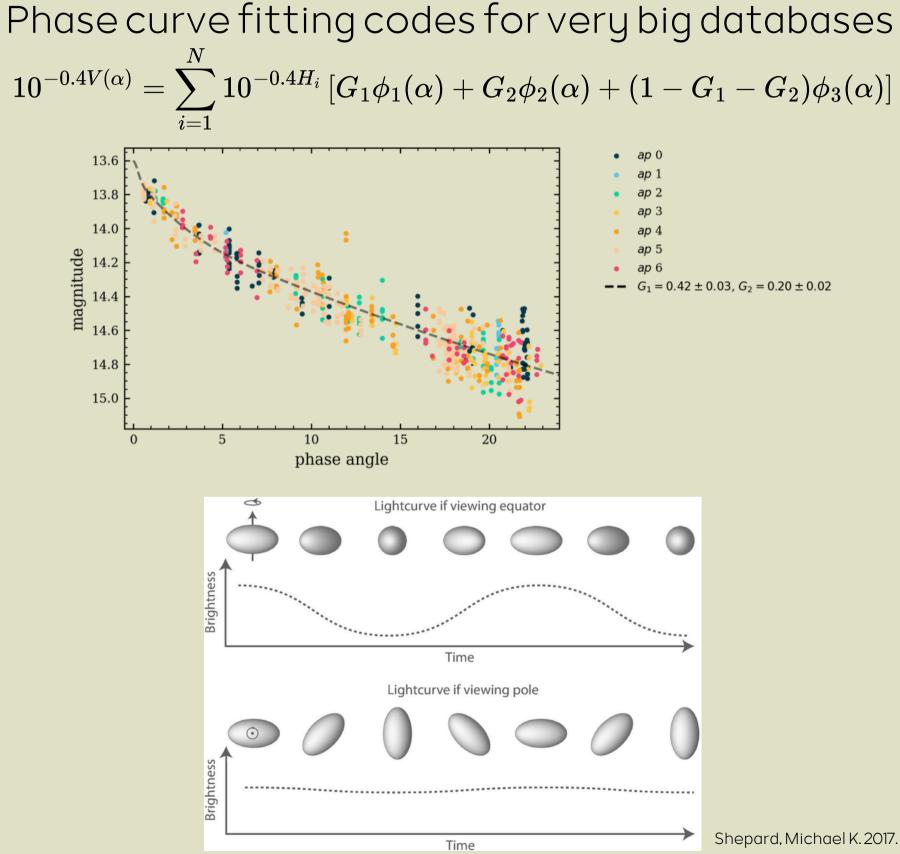
LPM-319:LSST Data Product Categories

Leanne Guy, SSSC Readiness Sprint 2024



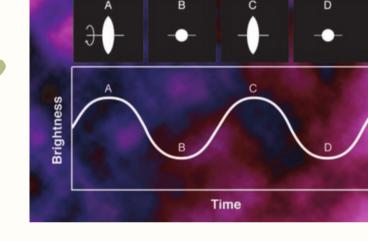
Lightcurves

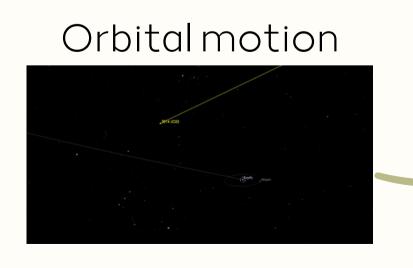


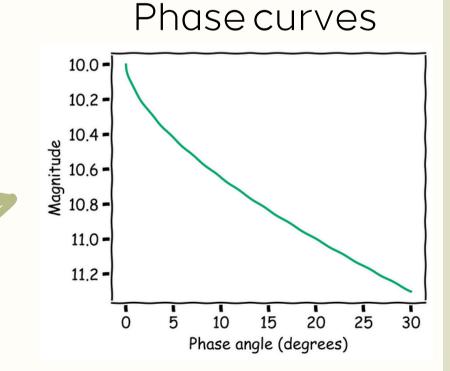


Rotation





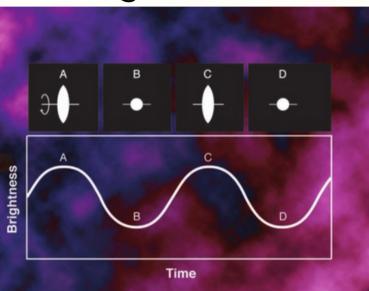




Already done **ATLAS data version 2**

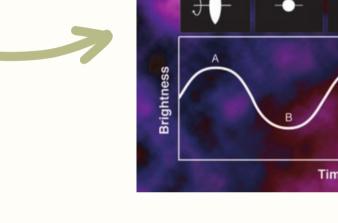


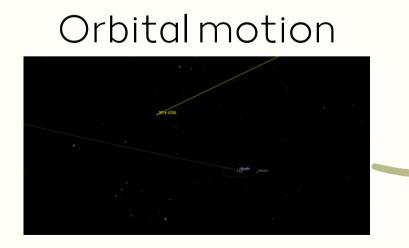
Lightcurves

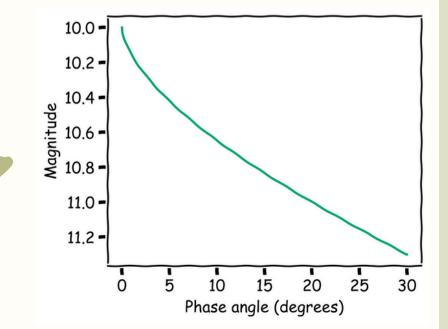


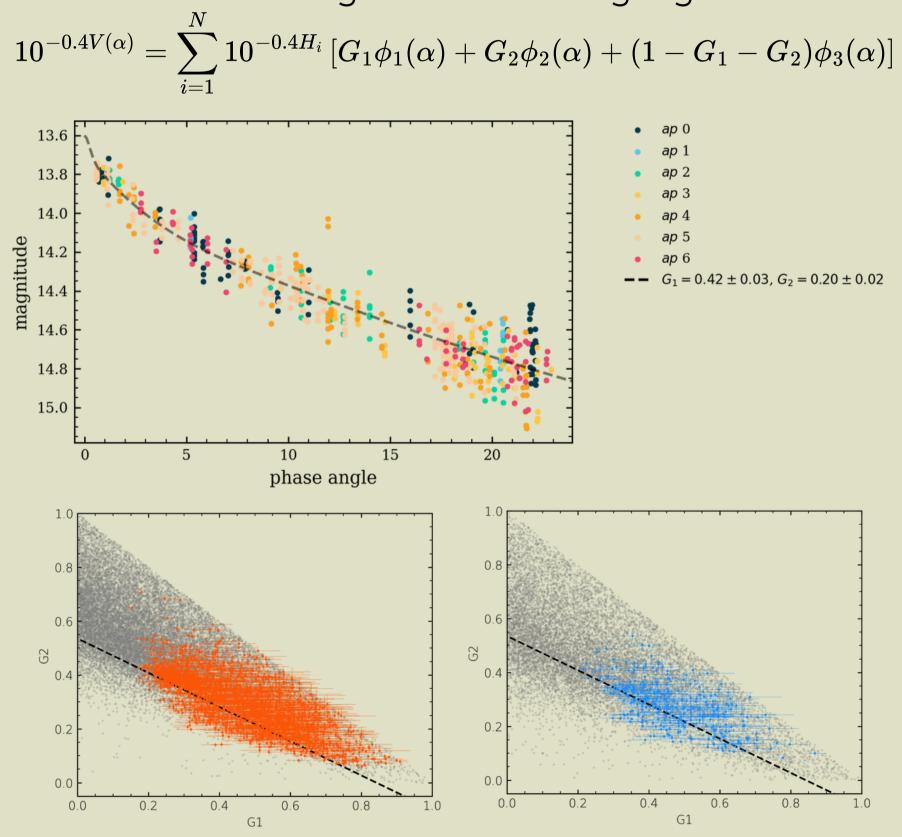
Rotation







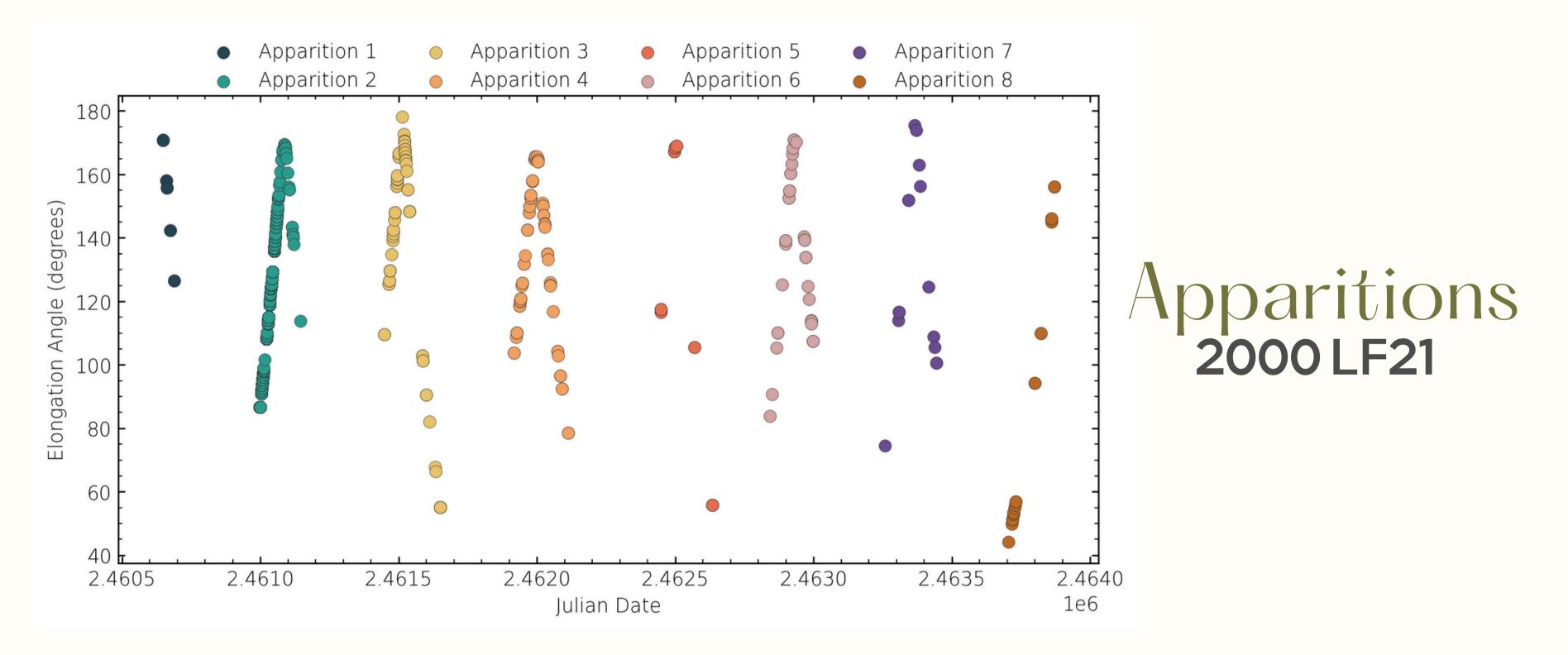


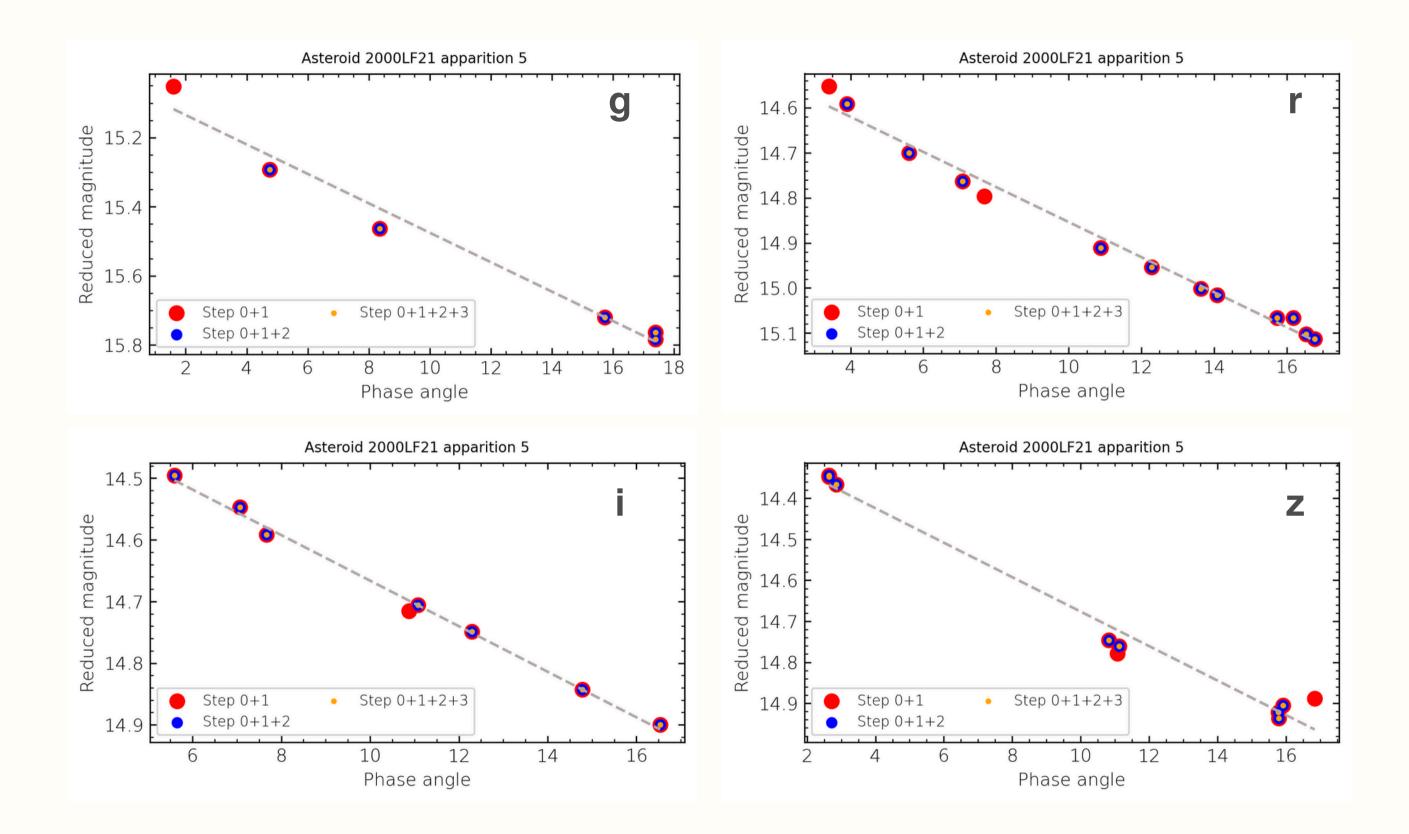


Already done **ATLAS data version 2**

Phase curve fitting codes for very big databases

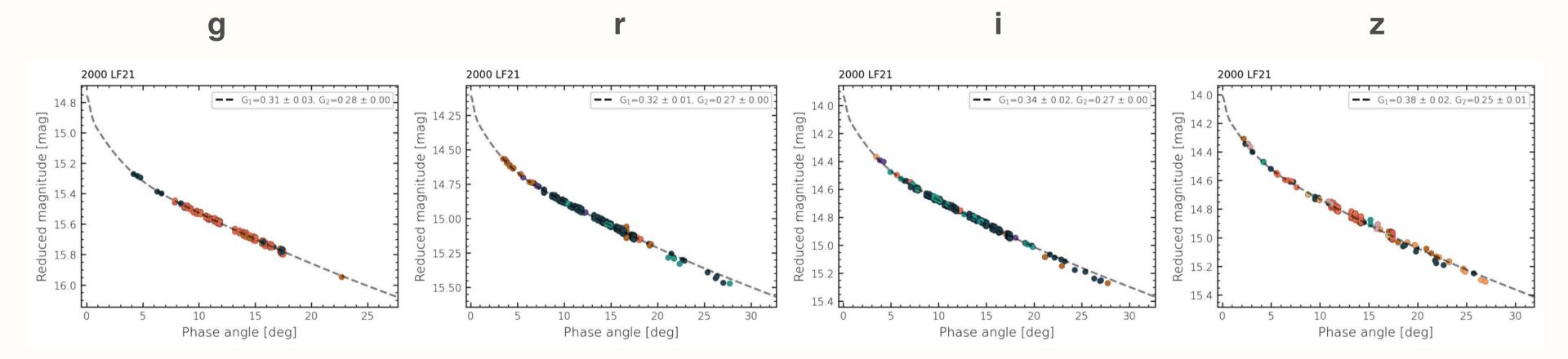
Our codes are general enough to be readapted and applied to other databases. Let's try with the LSST data!



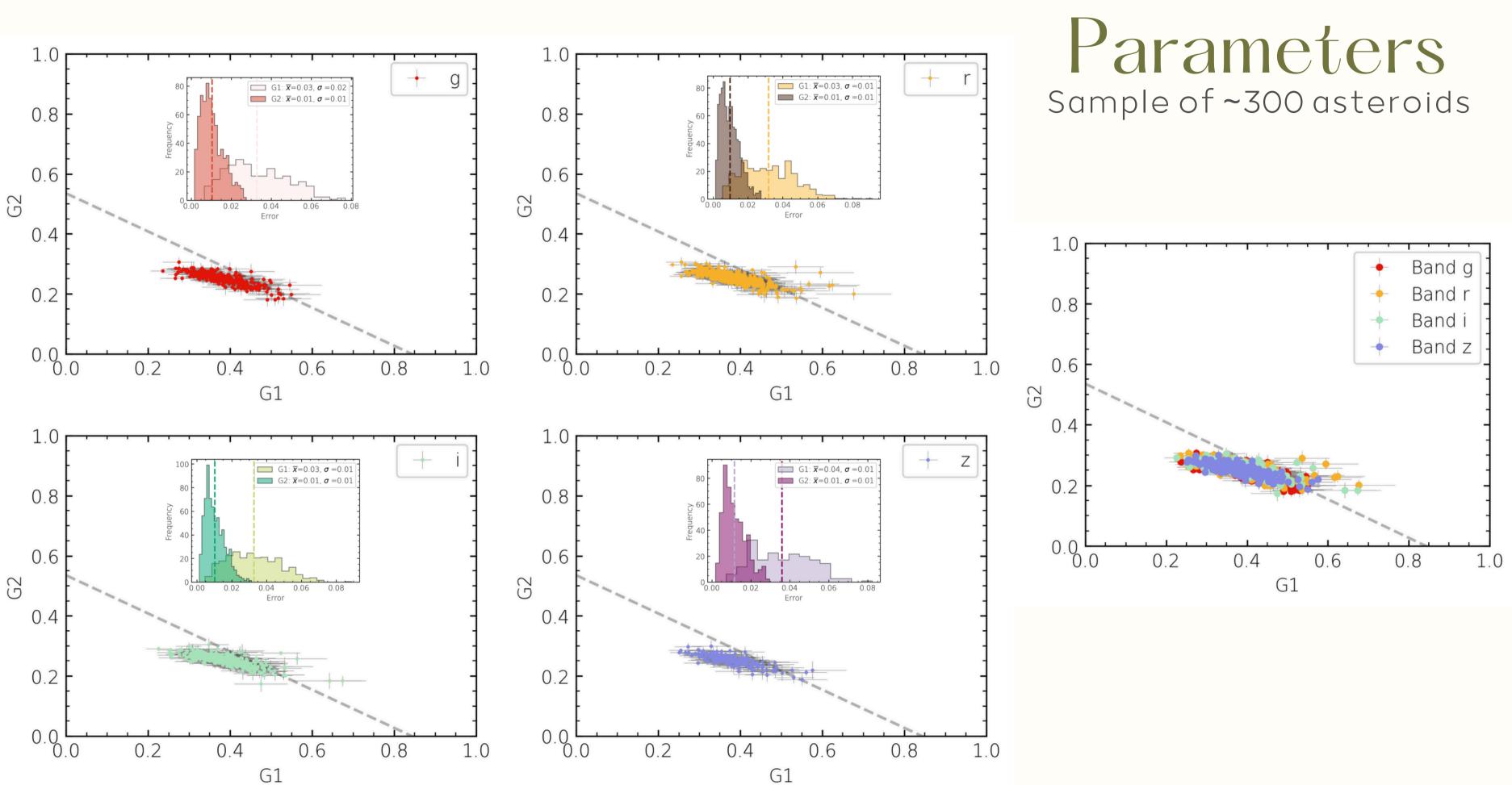


Outliers rejection 2001F21

Phase Curves 2000 LF21



There will be two more filters, u and y, but they are not available in DP0.3.



Final Thoughts

- We've already developed the algorithms, so we have about two years to test and improve them.
- There are many methods out there with different complexities and computational costs. Our next step is to analyze the relationship between complexity, precision, and computational cost.
- We also need to examine the combination of SDSS and SkyMapper data before the LSST is released.
- Thanks to the different filters, we can study many other aspects such as taxonomy, phase reddening, and more.
- And soon, with the arrival of LSST data, we'll be ready for exciting new discoveries!

Gracias!

I would like to thank Jamie Robinson and Meg Schwamb for their valuable support regarding DP0.3.