

Broadband Rubin Photometry as a First-Stage Physical Discriminator for Outer Solar System Objects

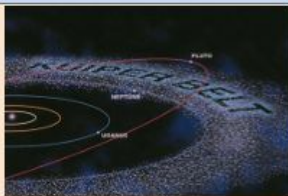


Becky Long⁽¹⁾, Nigel J Mason⁽¹⁾, Andjelka B Kovačević⁽²⁾,
(1) Physics & Astronomy, University of Kent, Giles Lane, Canterbury, Kent, United Kingdom
(2) Faculty of Mathematics, University of Belgrade, Studentski trg, 11158, Belgrade, Serbia
For further contact of Becky Long - rl454@kent.ac.uk

University of
Kent



What are we doing?



<https://science.nasa.gov/solar-system/kuiper-belt/10-things-to-know-about-the-kuiper-belt/>

- ★ Spectroscopy is expensive; can broadband photometry be a first-stage discriminator?
- ★ Vera Rubin will map thousands of objects using broadband photometry.
- ★ Identifying targets starting with Kuiper Belt objects for follow up studies.

How did we do it?

- Forward modelled 5 KBO surface compositions, Table 1.
- Simulated reflectance spectra using NASA PSG.
- Combined with LSST *ugrizy* colour filters to obtain expected observed magnitudes.
- Different compositions constructed in colour-colour space.

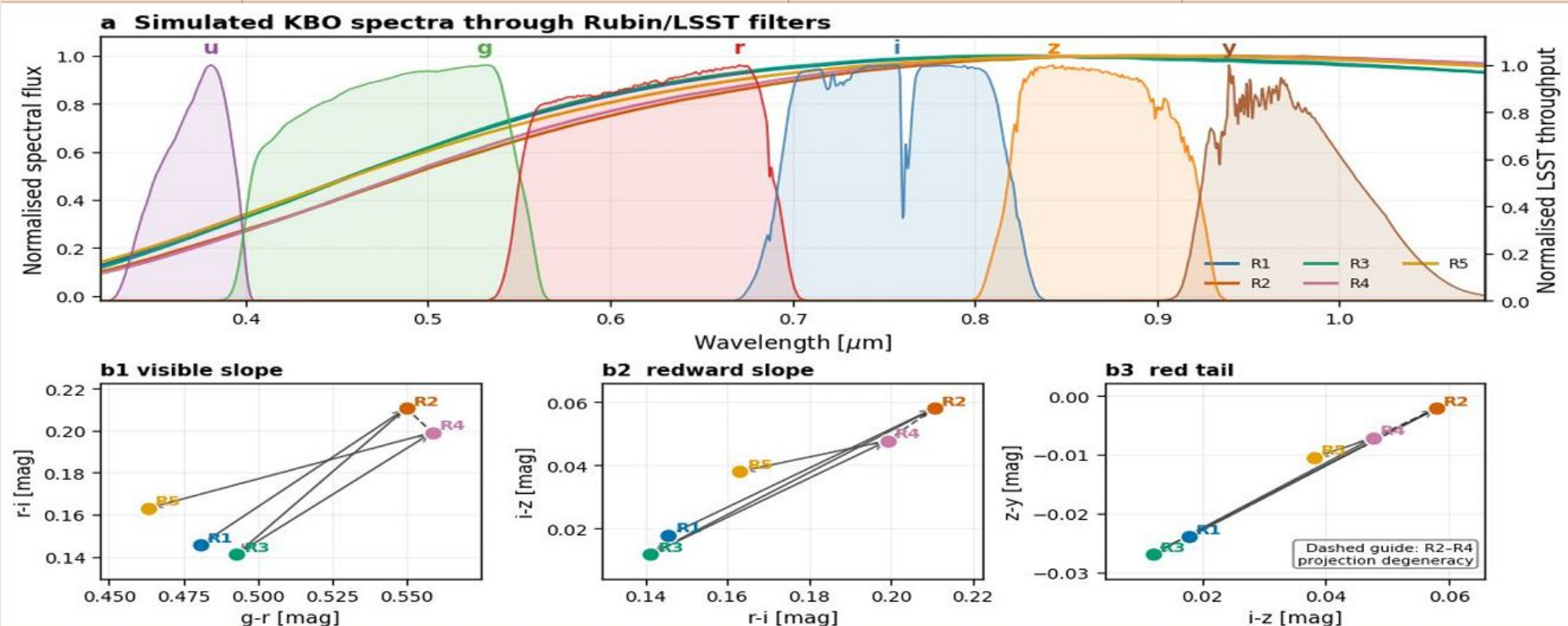


What did we find?

- ★ Theoretical colour changes in the *ugrizy* colour bands.
- ★ Not all colour bands are suitable for the observations as redder bands collapse to 1D plane.
- ★ Complete separation of the composition positions in the lower bluer colour bands.
- ★ This type of study has not previously been attempted.

Table 1

Run	Spectral-analogue composition	Physical state	Expected colour / science
R1	100% achondrite	Inactive rocky baseline	Featureless photometric floor
R2	40% organic + 60% achondrite	Organic-rich irradiated	Strong reddening in g–r and r–i
R3	30% ice analogue + 70% achondrite	Ice-rich surface	Reflective; greyer; near baseline
R4	40% achondrite + 30% ice + 30% organic	Mixed ice–organic	Blended red/grey signature
R5	R4 + activity component	Exploratory weak activity	Grey/chromatic displacement



References

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