Initial results from the near-ultraviolet survey of Col-OSSOS trans-Neptunian objects

Nicole Tan, Michele Bannister, Wesley Fraser, Susan Benecchi, J. J. Kavelaars, Stephen Gwyn, Todd Burdullis, Mike Alexandersen, Laura Buchanan, Ying-Tung Chen, et al.

Bulletin of the AAS • Vol. 53, Issue 7 (DPS53 Abstracts)

Initial results from the near-ultraviolet survey of Col-OSSOS trans-Neptunian objects

Nicole Tan[1], Michele Bannister[1], Wesley Fraser[2], Susan Benecchi[3], J.J. Kavelaars[2], Stephen Gwyn[4], Todd Burdullis[5], Mike Alexandersen[6], Laura Buchanan[7], Ying-Tung Chen[8], Brett Gladman[9], Mathew Lehner[8], Michael Marsset[10], Nuno Peixinho[11], Jean-Marc Petit[12], Rosemary Pike[13], Megan Schwamb[7], Kathryn Volk[14], Shiang-Yu Wang[8]

[1]University of Canterbury, [2]NRC-Herzberg Astronomy and Astrophysics, [3]Planetary Science Institute, [4]Canadian Astronomy Data Centre, [5]Canada-France-Hawaii Telescope Corporation, [6]Center for Astrophysics | Harvard & Smithsonian, [7]Queen's University Belfast, [8]Institute of Astronomy and Astrophysics, Academia Sinica, [9]University of British Columbia, [10]Massachusetts Institute of Technology, [11]CITEUC — Centre for Earth and Space Science Research of the University of Coimbra, [12]CNRS / Observatoire De Besançon, [13]Smithsonian Astrophysical Observatory, [14]Lunar and Planetary Laboratory, University of Arizona

Published on: Oct 03, 2021

The outer Solar System contains trillions of small objects made of ice and rock; yet, few have been explored in near-ultraviolet wavelengths. The surface composition of trans-Neptunian objects (TNOs) is a relic of the early planetesimal disk, and studying them provides insight into the evolutionary history of the Solar System. In particular, the far to near ultraviolet holds potential for understanding how the ices and organic materials of minor planet surfaces are modified under the effect of UV and charged particles. Furthermore, carbonaceous materials are spectrally active in the ultraviolet as compared to in the traditional visible and near-infrared wavelengths; observing TNOs in the near-ultraviolet offers a unique avenue to study the composition of carbon-bearing surfaces.

Using data from the Canada-France-Hawaii Telescope (CFHT), we are studying TNOs in the first major near-UV survey of the outer Solar System. 165 objects spanning the full TNO population range have been observed in u ($\lambda \sim 370$ nm) from August 2014 to July 2019. The CFHT data has been acquired simultaneously with g, r, and J photometry from the Gemini-North telescope as part of the Colours of the Outer Solar System Origins Survey (Col-OSSOS). Our u-band survey is the first to have routine simultaneous photometry by two major observatories, yielding two-telescope data on 63 objects. Col-OSSOS has already shown that the cold classical Kuiper belt population occupy a unique colour space in the r- and z-band; further photometry of the Col-OSSOS sample enables expansion to a full set of pan-chromatic surface reflectance measurements. With Col-OSSOS data implying two separate surface classes of TNOs in the optical-IR region (Fraser et al., this meeting), the near-UV survey affords the opportunity to investigate if this bimodal classification continues in the u-band, or if additional colour classes are needed. Here, we present preliminary results from our analysis of this near-UV survey.