PDC 2025
Stellenbosch, Cape Town, South Africa

Please submit your abstract at `https://iaaspace.org/pdc`.

(please select the topic that best fits your abstract from the list below)
(you may also add a general comment - see end of this document)

○ **NEO Characterization**

Radar and optical tracking of Near-Earth Objects at the University of Tasmania

Guifre Molera Calves[a,1,*], Oliver James White[a], Shinji Horiuchi[b], Edwin Peters[c], Ed Kruzins[c], Nick Stacy

[a] *University of Tasmania, Churchill Ave, Hobart, TAS 7005, Australia*
[b] *Commonwealth Scientific Industrial Research Organisation, Clunies Ross St, Black Mountain, ACT 2601, Australia*
[c] *University of New South Wales Canberra, Northcott Drive, Campbell, ACT 2612, Australia*

Keywords: radio telescopes, VLBI, bistatic radar, Southern Hemisphere

We present the use of the University of Tasmania's (UTAS) optical and radio telescopes to conduct observations of near-Earth objects from 2021 to 2024. The Canberra Deep Space Communications Complex transmitted at 7159.45 MHz, with the radar echo detected by the UTAS radio telescopes. The method of accounting for the Doppler shift between the stations and the near-Earth object will be described so as others could implement a similar program. We share our results, with confirmed detections of 1994 PC1 using the Hobart and Katherine 12m antennas, 2003 UC20 and 2024 MK with the Hobart 12m antenna, demonstrating the feasibility of using small radio telescopes for these observations. Data collected from other observatories, such as Tidbinbilla, as well as UTAS radar tracking of the moon, will also be presented in the context of demonstrating the means of applying these Doppler corrections and the accuracy of each method. Optical observations conducted in this period will also be detailed, as they complement radar observations and aid in refining the orbit parameters. Furthermore, in 2024 we have incorporated observations with optical telescopes to broader the scope of our measurements in the context for planetary defence.

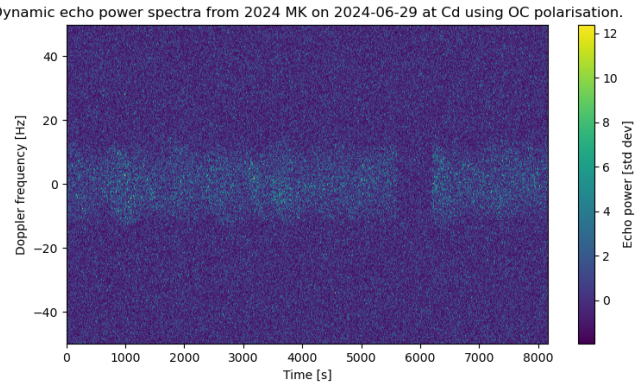

Figure 1: Waterfall of the radar echo reflected on 2024 MK. The tone was received at Ceduna radio telescope and transmitted by the NASA Deep Station in Canberra.

*Corresponding author
Email address: guifre.moleracalves@utas.edu.au (Guifre Molera Calves)