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○ **NEO Characterization**

Impact probability predictions for 2024 PDC25 via jet transport techniques

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In this work, we apply jet transport techniques as implemented in the open-source software package NEOs.jl [1, 2] to the problem of orbit determination and impact probability predictions for asteroid 2024 PDC25, the hypothetical scenario for the 9th Planetary Defense Conference 2025. From the astrometry file available for 2024 PDC25 at Epoch 1 [3], we perform a preliminary orbit determination using only observations from the first three nights available in the file. We then perform an orbit determination to the full astrometry dataset until Epoch 1, taking as initial guess the output from the preliminary orbit determination step. We use the latter orbital fit to propagate the asteroid region of uncertainty until its close approach to the Earth in 2041. Finally, we provide impact probability figures for the close approach to the Earth in 2041, and assess how observations in August 2025 will affect these predictions.

Comments:
We prefer a oral presentation.

References

[1] J. A. Pérez-Hernández, Dynamics of Near-Earth objects: the Yarkovsky effect for asteroid Apophis and the Lyapunov spectrum of Halley's comet, Ph.D. thesis, Universidad Nacional Autónoma de México, 2021.
[2] J. A. Pérez-Hernández, L. E. Ramírez-Montoya, L. Benet, NEOs.jl: v0.11.0. URL: https://github.com/PerezHz/NEOs.jl, 2024.
[3] CNEOS NASA-JPL, Asteroid 2024 PDC25 astrometry file, https://cneos.jpl.nasa.gov/pd/cs/pdc25/2024pdc25.xml, 2024. Accessed: 2024-12-15.

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