

# Coronagraphic Imaging of the Exoplanet TWA 7 b

**Mahdi Mousavi**

COSPAR 2025 - A Hands-on Workshop with JWST-UVIT  
CHRIST (Deemed to be University)  
20-31 Oct 2025

**James Webb Telescope's First Direct Image of a New Planet ...**

YouTube · Sakshi TV · 2:49  
10 Jul 2025

James Webb Telescope discovers first direct image of exoplanet TWA7B, a gas giant 110 light-years away, showing its ability to find smaller, colder planets.

**Scientists Spot Young Saturn-Mars Planet TWA 7b | WION ...**

YouTube · WION · 1:16  
26 Jun 2025

James Webb Telescope discovers a young exoplanet, **TWA 7b**, orbiting a star 110 lightyears away. It is 10x lighter than imaged planets and offers insights into planetary formation.

**JWST's New Exoplanet - TWA 7b!**

YouTube · Your Space Journey · 6:18  
15 Jul 2025

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**James Webb space telescope**

This article is more than 4 months old

**James Webb telescope captures direct images of Saturn-sized exoplanet**

TWA 7b is 110 light years away and by far the smallest-mass planet to be observed by direct imagery

The image of the disc around the star TWA 7, with the exoplanet at CC#1. Photograph: Anne-Marie Lagrange et al.

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**Evidence for a sub-jovian planet in the young TWA7 disk**

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Under revision at Nature  
Initial version submitted on July, 25<sup>th</sup>, 2024  
Revised version submitted on January, 19<sup>th</sup>, 2025

The following cell will run the Coron1Pipeline for all input data in the spaceKLIP database, saving the output to a subdirectory named `stage1`. This can take a long time to run, so be patient.

```
[1]: spaceKLIP.coron1pipeline.run_obs(database=database,
                                     steps={'group_scale': {'skip': False},
                                             'dg_init': {'skip': False, 'save_results': False},
                                             'saturation': {'n_pix_grow_sat': 1,
                                                'grow_diagonal': False},
                                             'ipc': {'skip': True},
                                             'firstframe': {'skip': False},
                                             'lastframe': {'skip': False},
                                             'reset': {'skip': False},
                                             'linearity': {'skip': False},
                                             'rsd': {'skip': False},
                                             'dark_current': {'skip': True},
                                             'refpix': {'skip': False,
                                            'odd_even_columns': True},
                                             'jump': {'n': 1,
                                                'four_group_rejection_threshold': 8.,
                                                'maximum_cores': '1'},
                                             'ramp_fit': {'save_calibrated_ramp': False,
                                              'maximum_cores': '1'},
                                             'gain_scale': {'skip': False},
                                             'subdir': 'stage1'})
```

[spaceKLIP.coron1pipeline:INFO] --> Concatenation JWST\_MIRI\_MIRIMAGE F1140C NONE 40PM 1140 MASK1140  
[spaceKLIP.coron1pipeline:INFO] --> Coron1Pipeline: processing jw03662001001\_04101\_00001\_mirimage\_uncal.fits

We can now examine the updated database, which shows that all available files for each filter have been processed to Stage 1.

Note: The Stage 0 files are automatically removed from the database since there is no further processing required for them. However, the files remain on disk.

```
[1]: #database.summarize()
```

### Display Stage 1 Reductions

Let's examine the science and reference PSF data in the F1550C filter we processed through the Coron1Pipeline. You can use the built-in plotting function `spaceKLIP.plotting.display`.

# Stage 1



Kernel Restarting  
The kernel for TWA7b\_MIRI\_Reduction.ipnb appears to have died. It will restart automatically.

OK

[spaceKLIP.coron1pipeline:INFO] --> Concatenation JWST\_MIRI\_MIRIMAGE F1140C NONE 40PM 1140 MASK1140  
[spaceKLIP.coron1pipeline:INFO] --> Coron1Pipeline: processing jw03662001001\_04101\_00001\_mirimage\_uncal.fits

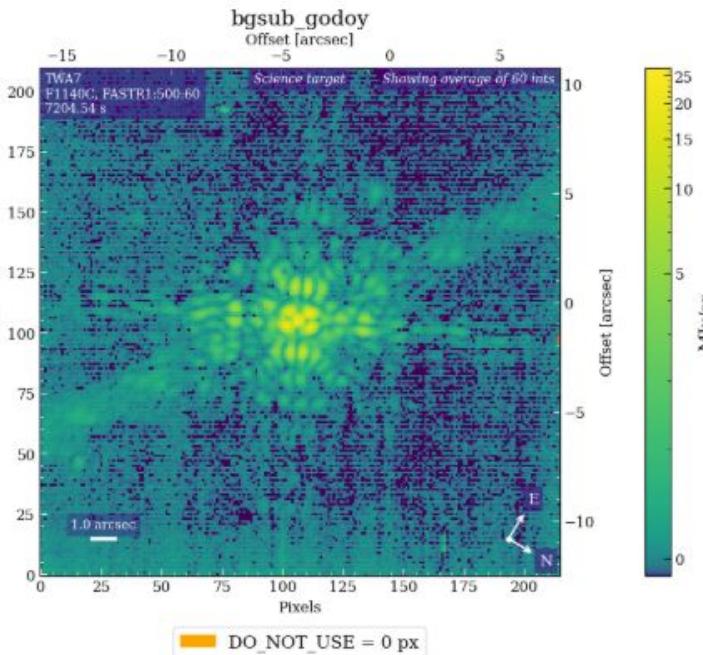
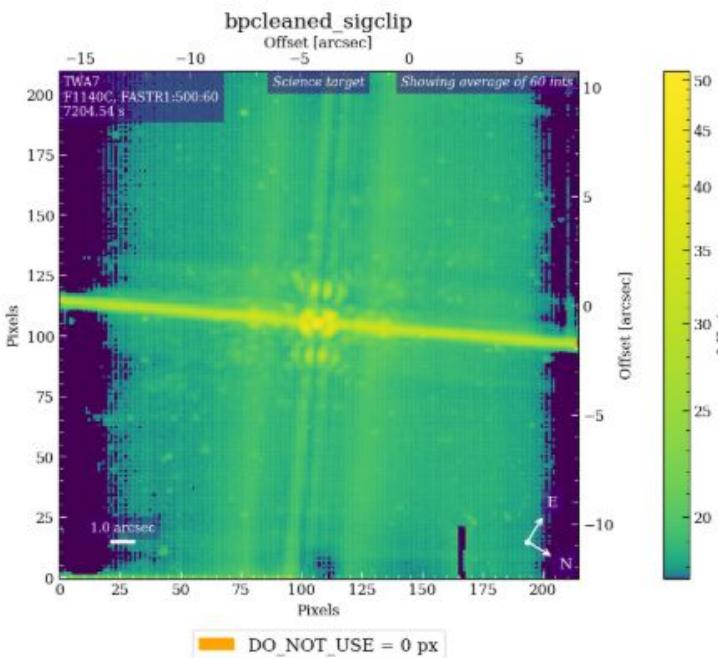
We can now examine the updated database, which shows that all available files for each filter have been processed to Stage 1.

Note: The Stage 0 files are automatically removed from the database since there is no further processing required for them. However, the files remain on disk.

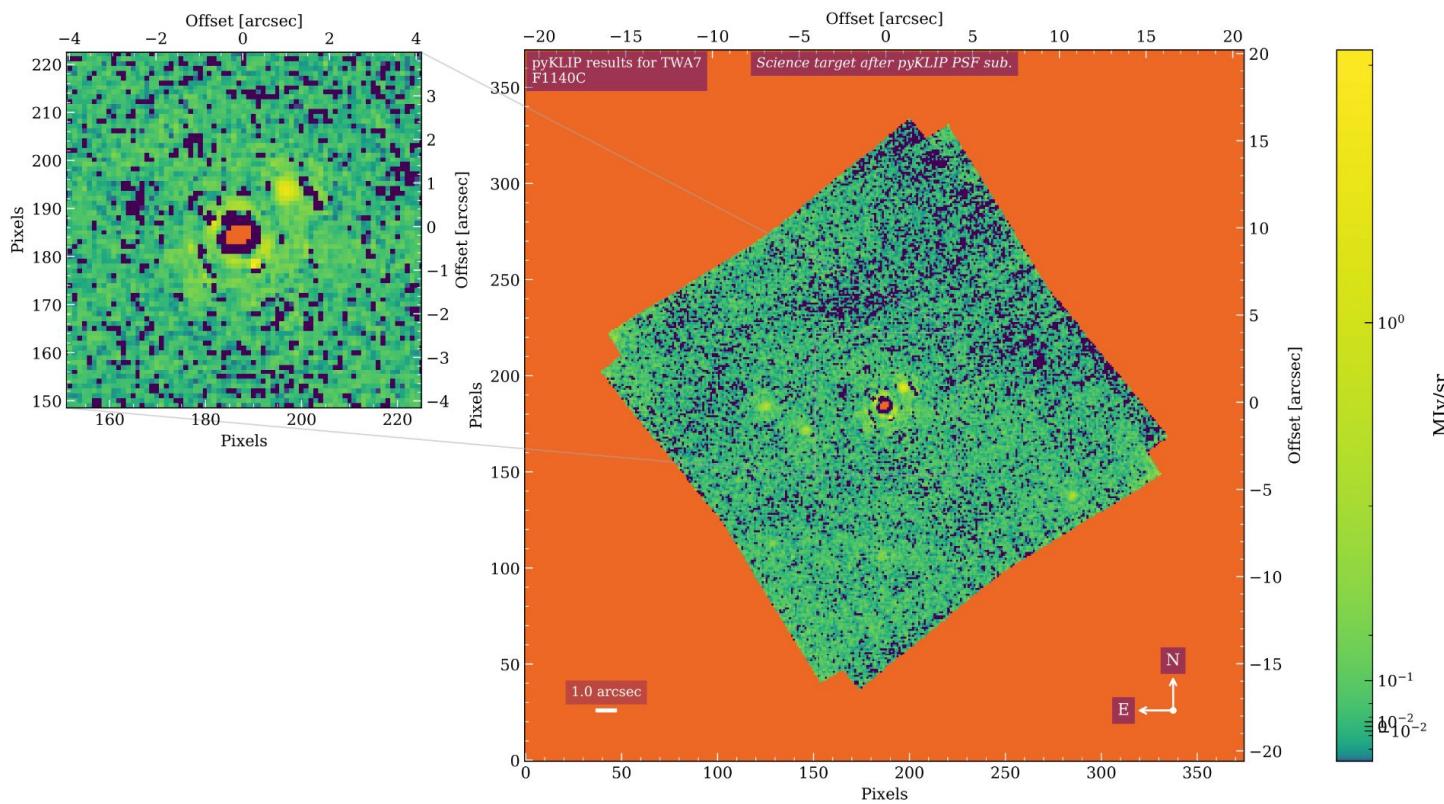
```
[1]: #database.summarize()
```

PID	USER	PR	NI	VIRT	RES	SHR	S	CPU%	MEM%	TIME	Command
3315	christ	20	0	12.4G	88688 27598	0	37.5	0.5	39.54	35	/snap/ftrreox/7
4231	christ	20	0	11.7G	68688 27598	0	33.5	0.5	40.49	34	/home/christ/ml
6991	christ	20	0	33848	28998 16904	0	24.3	3.0	11.25	34	/snap/ftrreox/7
3454	christ	20	0	12.4G	88696 27404	0	9.2	0.5	0:50.26	34	/snap/ftrreox/7
4467	christ	20	0	953M	11388 5884	0	5.3	0.1	2:01.23	34	/usr/bin/nautl
3506	christ	20	0	12.4G	88696 27404	R	4.6	0.5	2:17.59	34	/snap/ftrreox/7
3492	christ	20	0	12.4G	88696 27404	S	3.9	0.5	5:56.99	34	/snap/ftrreox/7
7482	christ	20	0	703K	19448 4416	S	3.9	0.1	1:30.66	34	/home/christ/ml
6911	christ	20	0	33848	28998 16904	S	2.0	1.3	0:02.96	34	/snap/ftrreox/7
41046	christ	20	0	12.4G	21268 27596	S	2.0	0.1	0:44.66	34	/tmp
14157	christ	20	0	2548K	21268 27596	S	2.0	0.1	0:44.66	34	/snap/ftrreox/7
20193	christ	20	0	12.4G	88888 27404	S	2.0	0.5	0:02.03	34	/snap/ftrreox/7
3449	christ	20	0	12.4G	88696 27404	S	1.3	0.5	3:18.99	34	/snap/ftrreox/7
3929	christ	20	0	7299K	2848 2869	F	1.3	0.1	1:08.59	34	/snap/ftrreox/7

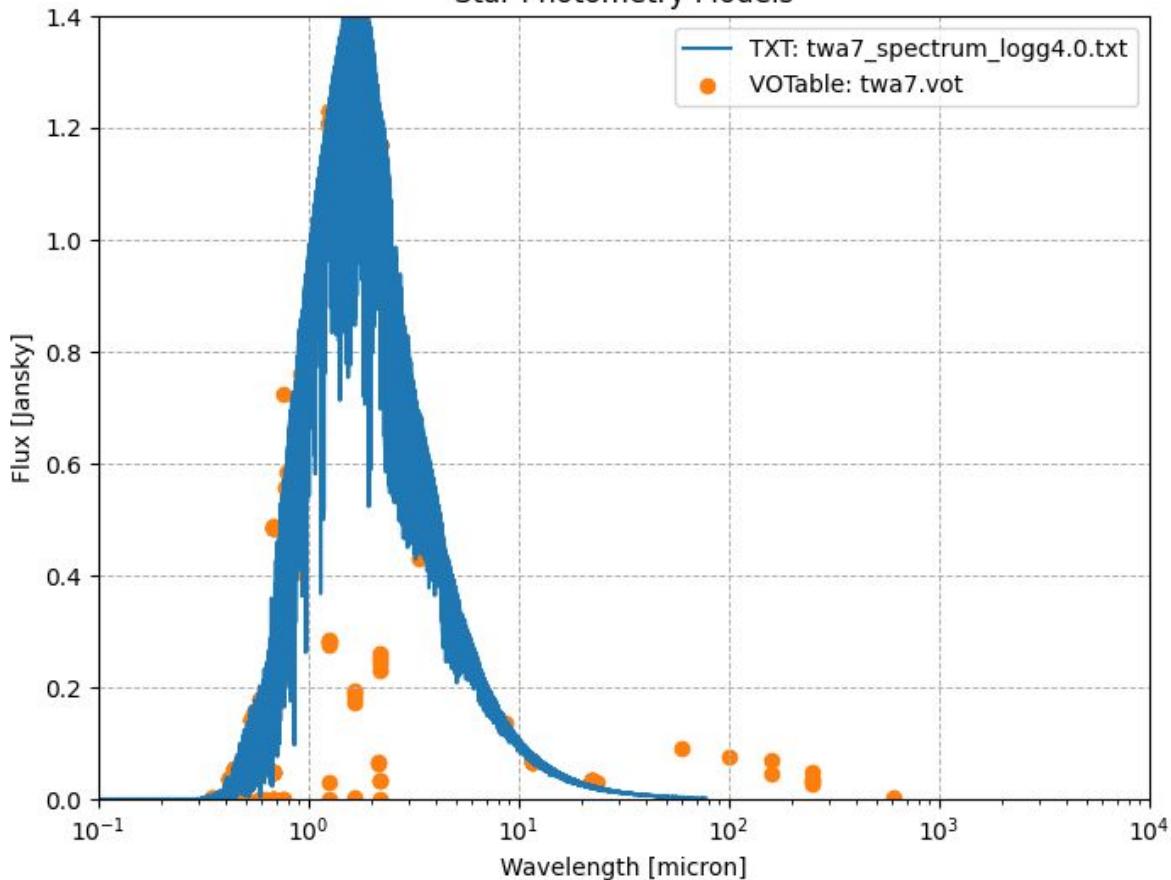
F1 Help F2 Setup F3 Search F4 Filter F5 Item F6 Sort By F7 Vice F8 Vice F9 Kill F10 Kill



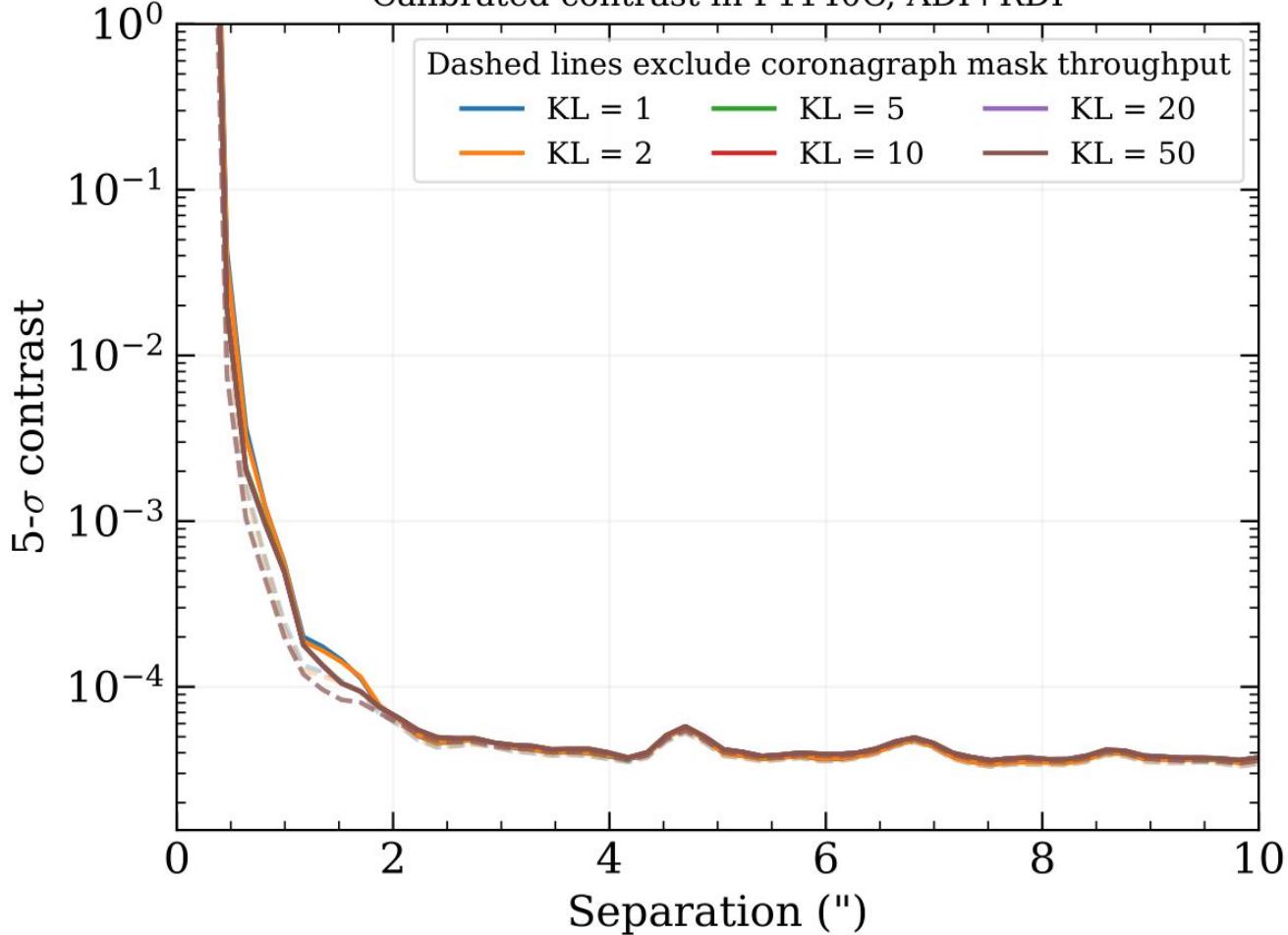
ADI+RDI NANNU1 NSUBS1 JWST MIRI MIRIMAGE F1140C NONE 4QPM 1140 MASK1140-KLmodes-all.fits



### Star Photometry Models



# Calibrated contrast in F1140C, ADI+RDI





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on the Instagram!**



# Thank You!