

# OpenSpyrit: an Ecosystem for Reproducible Single-Pixel Hyperspectral Imaging: supplement

## 1. OVERVIEW OF THE SPIHIM ACQUISITIONS

Here, we provide a list of acquisitions available in the open-access [SPIHIM](#) collection. The collection is stored in PILoT, our data warehouse based on the Girder web-based data management platform. Each acquisition is associated with a unique identifier (ID). The ID is a hyperlink that provides direct access to the folder containing the raw and reconstructed data files as well as the associated metadata. The `/overview/` folder contains several representations of the reconstructed hypercubes. A list of the objects that were imaged is given in Sec. [A](#). A list of the acquisitions that were performed is given in Sec. [B](#). A summary of the metadata is given in Sec. [C](#).

### A. Objects

The following objects have been imaged:

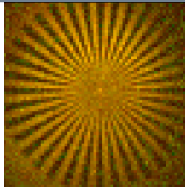
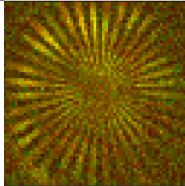
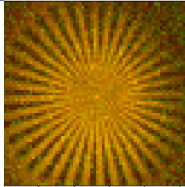
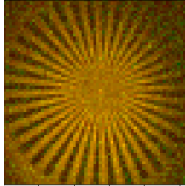
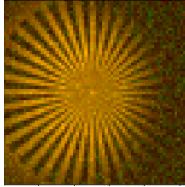
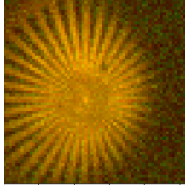
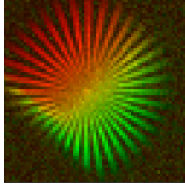
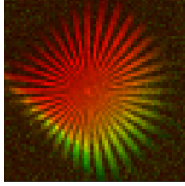
- **Star Sector**: a Siemens star resolution target (Thorlabs, R1L1S2P)
- **Cat**: a cat image from the STL-10 test set printed on a plastic sheet
- **PpIX**: Protoporphyrin IX diluted in a PBS solution
- **Color checker**: a color gauge micro target (more details [here](#))
- **USAF**: a spatial resolution target (Edmund, USAF 1951 38256)
- **Colored Star Sector**: a colored Siemens star printed on a plastic sheet
- **No object**: the DMD is directly illuminated by the source
- **Tomato slice**: a thin slice (few hundreds of  $\mu m$ ) of a cherry tomato
- **Horse**: a horse image from the STL-10 test set printed on a plastic sheet
- **White spot**: a pinhole that allows light through
- **Thorlabs box**: a well-known box
- **Blob**: a dry physarum polycephalum
- **Tree leaf**: a leaf from the *Salix purpurea* tree
- **Lamb brain**: an ex-vivo lamb brain
- **Apple**: a McIntosh apple

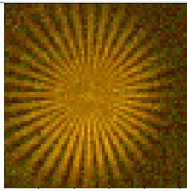
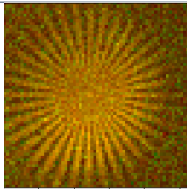
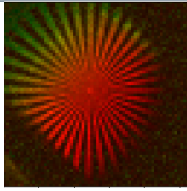
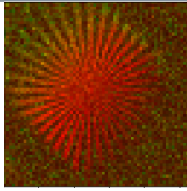
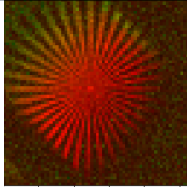
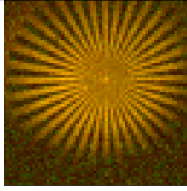
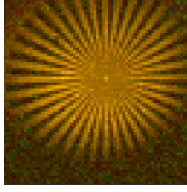
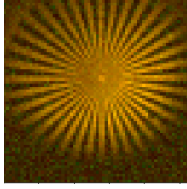
### B. Acquisition list

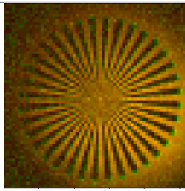
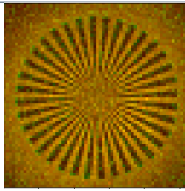
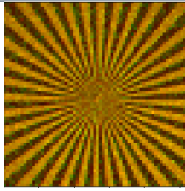
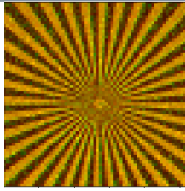
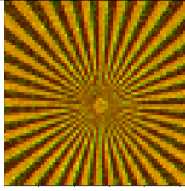
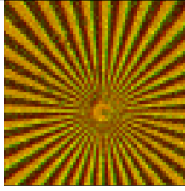
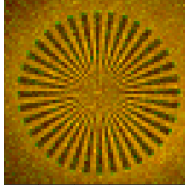
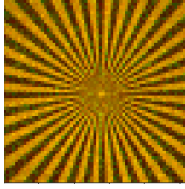
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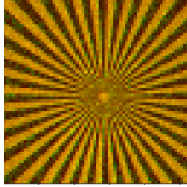
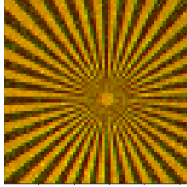
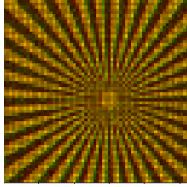
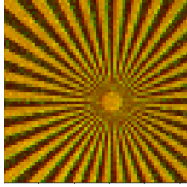
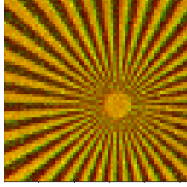
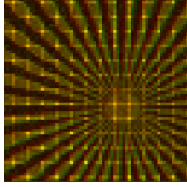
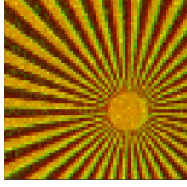
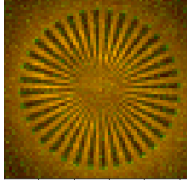
- **ID**: unique identifier of the acquisition.
- **Setup**: setup version, more details are available in the collection description [here](#).
- **Source**: illumination source, chosen among
  - **WLL**: a cold white LED array Light Source from Thorlabs (LIUCWHA).

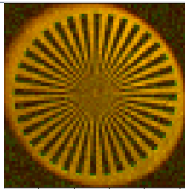
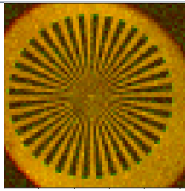


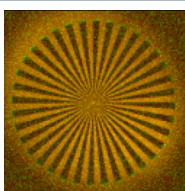
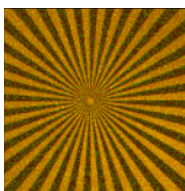
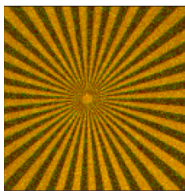
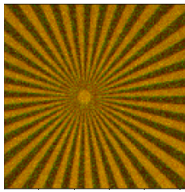
- **WLB**: a white lamp from Bioblock Scientific equipped with a halogen bulb (Philips 14501 150W GX5.3 20V).
- **WLZ**: a white lamp (KL 2500 LCD) from Zeiss.
- **405nm**: a laser MDL III405 working at 405 nm with a maximal power of 50 mW.
- **HgAr**: a Mercury-Argon spectral calibration lamp (Ocean Optics HG-1).
- **Leica**: a white source coming from the Leica surgical microscope.
- **Filter**: filter placed between the object and the DMD, chosen among
  - **Diffuser**: ground glass diffuser from Thorlabs (N-BK7).
  - **OD**: optical density.
  - **LinearColor**: a linear variable filter (Ocean Optics, LVF-HL).
- **Info**: complementary information such as
  - **Signal**: maximum signal found in the `/overview/*sum_wavelength_binning.png` figure.
  - **ti**: integration time of the spectrometer. If not specified,  $t_i = 1$  ms.
  - **zoom xX**: digital zoom realized by the DMD, where  $X \in \mathbb{N}$ . If not specified,  $\text{zoom} = x1$ .
  - **RasterScan**: a group of micromirrors is scanned, as opposed to the Hadamard-Walsh pattern scanning. Mathematically, the pattern matrix  $\mathbf{P}$  (see Eq. (1) of the main article) is chosen as the identity.
  - **[x mol/L]**: concentration of the solution.
  - **obj xX**: microscope objective where xX is the magnification.
  - **circular/square/Diag motion**: corresponds to different displacement trajectories of a diaphragm placed in front of the source.
  - **open/close**: is a succession of opening and closing of a diaphragm placed in front of the source.
  - **motion: x mm**: is the mechanical translation of a piston
- **Overview**: RGB representation of the full hypercube following the CIE.

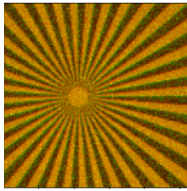
Star Sector					
ID	Setup	Source	Filter	Info	Overview
<a href="#">615df658</a> <a href="#">478214d8</a> <a href="#">c8a30aac</a>	v1.1	WLL	- Diffuser	- Signal = 2000	
<a href="#">615df6d3</a> <a href="#">478214d8</a> <a href="#">c8a30af8</a>	v1.1	WLL	- OD=0.6	- Signal = 500	
<a href="#">615df317</a> <a href="#">478214d8</a> <a href="#">c8a30913</a>	v1.1	WLL	- Diffuser	- Signal = 2000	
<a href="#">615df2c4</a> <a href="#">478214d8</a> <a href="#">c8a308ec</a>	v1.1	WLL	- Diffuser	- Signal = 2000	
<a href="#">615dea81</a> <a href="#">478214d8</a> <a href="#">c8a305ee</a>	v1.1	WLL	- Diffuser	- Signal = 3000	
<a href="#">615deabf</a> <a href="#">478214d8</a> <a href="#">c8a30614</a>	v1.1	WLL	- Diffuser	- Signal = 2500	
<a href="#">615de9cf</a> <a href="#">478214d8</a> <a href="#">c8a30595</a>	v1.1	WLL	- Diffuse - LinearColor	- Signal = 2000	
<a href="#">615dea06</a> <a href="#">478214d8</a> <a href="#">c8a305c1</a>	v1.1	WLL	- Diffuse - LineaColor	- Signal = 2000	

615de713 478214d8 c8a303f1	v1.1	WLL	- Diffuser	- Signal = 1600 - ti = 500 $\mu$ s	
615de750 478214d8 c8a30417	v1.1	WLL	- Diffuser	- Signal = 900 - ti = 250 $\mu$ s	
615de78c 478214d8 c8a3043d	v1.1	WLL	- Diffuse - LinearColor	- Signal = 2000	
615de7c8 478214d8 c8a30463	v1.1	WLL	- Diffuser linearColor	- Signal = 500 - ti = 250 $\mu$ s	
615de805 478214d8 c8a30489	v1.1	WLL	- Diffuser linearColor	- Signal = 1000 - ti = 500 $\mu$ s	
615de168 478214d8 c8a3008b	v1.1	WLL	- Diffuser	- Signal = 3000	
615de1a3 478214d8 c8a300b1	v1.1	WLL	- Diffuser	- Signal = 3000	
615de102 478214d8 c8a30064	v1.1	WLL	- Diffuser	- Signal = 4000	

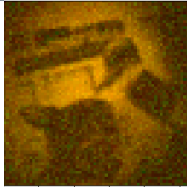
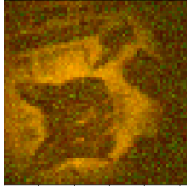
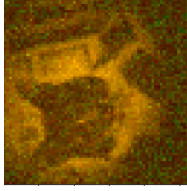
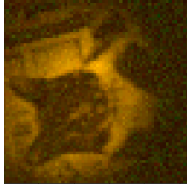
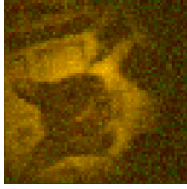
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61699285 478214d8 c8a30c63	v1.1	WLL	- Diffuser	- Signal = 2000 - zoom x1	
61699448 478214d8 c8a30c7d	v1.1	WLL	- Diffuser	- Signal = 2000 - zoom x2	
61699516 478214d8 c8a30c97	v1.1	WLL	- Diffuser	- Signal = 2000 - zoom x3	
61699615 478214d8 c8a30cb1	v1.1	WLL	- Diffuser	- Signal = 2000 - zoom x4	
61699b13 478214d8 c8a30cf4	v1.1	WLL	- Diffuser	- Signal = 2000 - zoom x6	
616fe689 478214d8 c8a30d77	v1.1	WLL	- Diffuser	- Signal = 2500 - zoom x1	
616fe8ac 478214d8 c8a30d8e	v1.1	WLL	- Diffuser	- Signal = 2500 - zoom x2	

616feb30 478214d8 c8a30da5	v1.1	WLL	- Diffuser	- Signal = 2500 - zoom x3	
616fec52 478214d8 c8a30dbc	v1.1	WLL	- Diffuser	- Signal = 2500 - zoom x4	
616fee22 478214d8 c8a30dd3	v1.1	WLL	- Diffuser	- Signal = 3500 - zoom x5	
616fefe1 478214d8 c8a30dea	v1.1	WLL	- Diffuser	- Signal = 2500 - zoom x6	
616ff279 478214d8 c8a30e01	v1.1	WLL	- Diffuser	- Signal = 2500 - zoom x8	
616ff693 478214d8 c8a30e18	v1.1	WLL	- Diffuser	- Signal = 6000 - zoom x10	
616fff63 478214d8 c8a30e2f	v1.1	WLL	- Diffuser	- Signal = 2500 - zoom x12	
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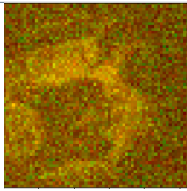
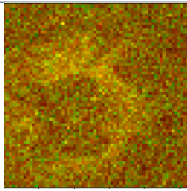
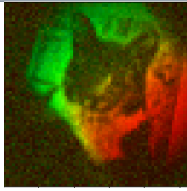
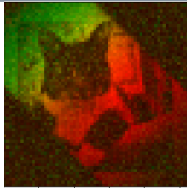
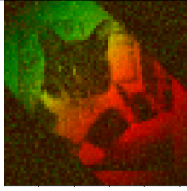
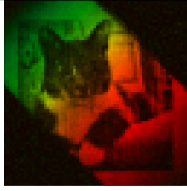
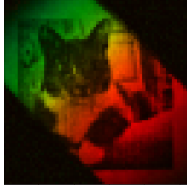
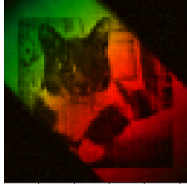
<a href="#">61af6d473f7ce79f5e565bdb</a>	v1.2	WLL	- Diffuser	- Signal = 5000	
<a href="#">61e1984dcdb6910b899d012d</a>	v1.3	WLL	- Diffuser	- Signal = 3800	
<a href="#">61e19b3fcdb6910b899d0147</a>	v1.3	WLL	- Diffuser linearColor	- Signal = 2400	
<a href="#">622b57f743258e76eab21719</a>	v1.3	WLL	- Diffuser	- Signal = 3500	
<a href="#">633ab947ebe9129ae993e691</a>	v1.3	WLL	- Diffuse - HighPass 500nm - LowPass 750nm	- Signal = 1200 - zoom x1 - ti = 1ms	
<a href="#">633ab7ec ebe9129a e993e671</a>	v1.3	WLL	- Diffuser - HighPass 500nm - LowPass 750nm	- Signal = 1200 - zoom x2 - ti = 4ms	
<a href="#">633ab5a2 ebe9129a e993e651</a>	v1.3	WLL	- Diffuser - HighPass 500nm - LowPass 750nm	- Signal = 1200 - zoom x3 - ti = 9ms	
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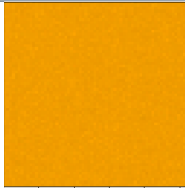
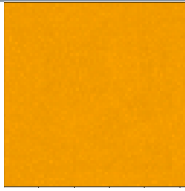
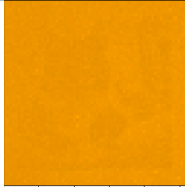
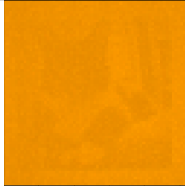
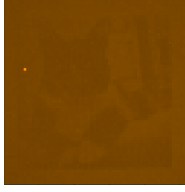
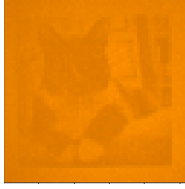
633aae77 ebe9129a e993e611	v1.3	WLL	- Diffuser - HighPass 500nm - LowPass 750nm	- Signal = 1200 - zoom x6 - ti = 36ms	
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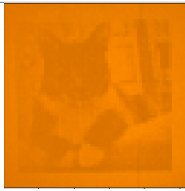
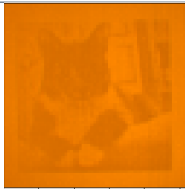
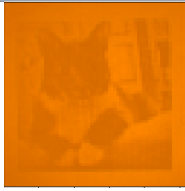

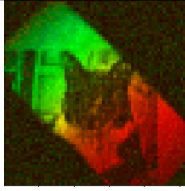

**Table S1.** List of acquisition data for the object: Star Sector

Cat					
ID	Setup	Source	Filter	Info	Overview
615df695 478214d8 c8a30ad2	v1.1	WLL	- Diffuser	- Signal = 2500	
615de880 478214d8 c8a304d5	v1.1	WLL	- Diffuser	- Signal = 150 - ti = 500 $\mu$ s	
615de8bc 478214d8 c8a304fb	v1.1	WLL	- Diffuser	- Signal = 150 - ti = 500 $\mu$ s	
615de5b2 478214d8 c8a3032a	v1.1	WLL	- Diffuser	- Signal = 4000	
615de5ed 478214d8 c8a30350	v1.1	WLL	- Diffuser - OD=0.3	- Signal = 2000	




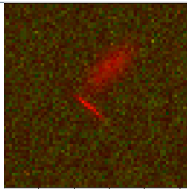
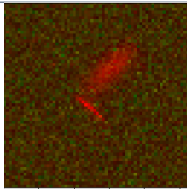
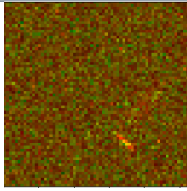
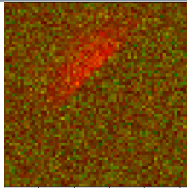
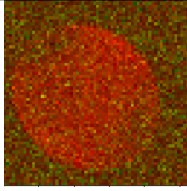
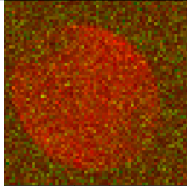
615de628 478214d8 c8a30376	v1.1	WLL	- Diffuse - OD=1	- Signal = 300	
615de668 478214d8 c8a3039c	v1.1	WLL	- Diffuser - OD=1.3	- Signal = 200	
615de562 478214d8 c8a302e5	v1.1	WLL	- Diffuser - linearColor	- Signal = 2000	
61781255 478214d8 c8a3119e	v1.1	WLL	- Diffuser - linearColor	- Signal = 1300	
617812d3 478214d8 c8a311b8	v1.1	WLL	- Diffuser - linearColor	- Signal = 1300	
61781474 478214d8 c8a311d2	v1.1	WLL	- Diffuser - linearColor	- Signal = 13000 - ti = 10ms	
617815f0 478214d8 c8a311ec	v1.1	WLL	- Diffuser - linearColor	- Signal = 26000 - ti = 20ms	
61781784 478214d8 c8a31206	v1.1	WLL	- Diffuser - linearColor	- Signal = 26000 - ti=20ms	

6177f615 478214d8 c8a3107f	v1.1	WLL	- Diffuser	- Signal = 2000	
61780ed0 478214d8 c8a31183	v1.1	WLL	- Diffuser	- Signal = 2000	
617807c3 478214d8 c8a3114f	v1.1	WLL	- Diffuser	- Signal = 38 - RasterScan - ti = 1ms	
617807a0 478214d8 c8a31135	v1.1	WLL	- Diffuser	- Signal = 42 - RasterScan - ti = 2ms	
61780769 478214d8 c8a3111b	v1.1	WLL	- Diffuser	- Signal = 48 - RasterScan - ti = 4ms	
61780722 478214d8 c8a31101	v1.1	WLL	- Diffuser	- Signal = 60 - RasterScan - ti = 8ms	
617806b9 478214d8 c8a310e7	v1.1	WLL	- Diffuser	- Signal = 83 - RasterScan - ti = 16ms	
6177fcf8 478214d8 c8a31099	v1.1	WLL	- Diffuser	- Signal = 134 - RasterScan - ti = 32ms	

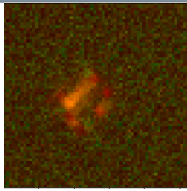
6178063a 478214d8 c8a310cd	v1.1	WLL	- Diffuser	- Signal = 226 - RasterScan - ti = 64ms	
617803b7 478214d8 c8a310b3	v1.1	WLL	- Diffuser	- Signal = 430 - RasterScan - ti = 128ms	
61780dfb 478214d8 c8a31169	v1.1	WLL	- Diffuser	- Signal = 800 - RasterScan - ti = 256ms	
622b65d5 43258e76 eab217b3	v1.3	WLL	- Diffuser	- Signal = 3000	
622b5ea8 43258e76 eab21740	v1.3	WLL	- Diffuser - linearColor	- Signal = 1750	
623adf05 43258e76 eab217da	v1.3	WLL	- Diffuser	- Signal = 3000	

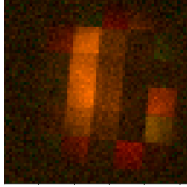
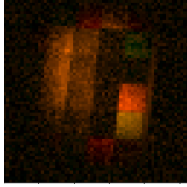
**Table S2.** List of acquisition data for the object: Cat

PpIX					
ID	Setup	Source	Filter	Info	Overview
615df175 478214d8 c8a30851	v1.1	405nm	- HighPass 500n - LowPass 750nm	- Signal = 700 - $[10^{-3}mol/L]$	

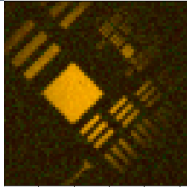
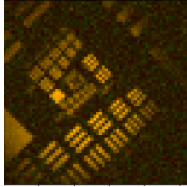
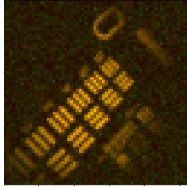
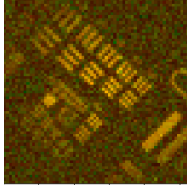
615df1af 478214d8 c8a30877	v1.1	405nm	- HighPass 500nm - LowPass 750nm	- Signal = 600 - $[10^{-3}mol/L]$	
615df1ed 478214d8 c8a3089d	v1.1	405nm	- HighPass 500nm - LowPass 750nm	- Signal = 600 - $[10^{-3}mol/L]$	
615df22b 478214d8 c8a308c3	v1.1	405nm	- HighPass 500nm - LowPass 750nm	- Signal = 400 - $[10^{-3}mol/L]$	
615df045 478214d8 c8a307b8	v1.1	405nm	- HighPass 500nm - LowPass 750nm	- Signal = 100 - $[10^{-3}mol/L]$	
6373aa32 4d15dd53 6f048098	v1.3.1	405nm	- HighPass 500nm - LowPass 750nm	- Signal = 800 - $[1.510^{-5}mol/L]$ - ti = 50ms	
6373aa32 4d15dd53 6f048098	v1.3.1	405nm	- HighPass 500nm - LowPass 750nm	- Signal = 200 - $[1.510^{-5}mol/L]$ - ti = 10ms	

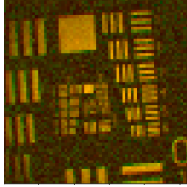
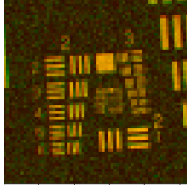
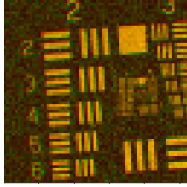
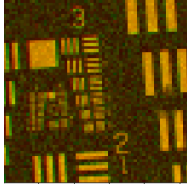
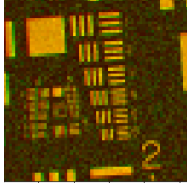
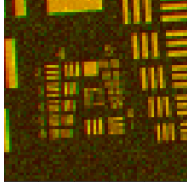
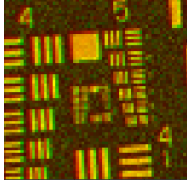
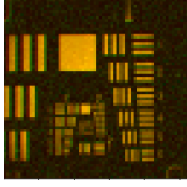
**Table S3.** List of acquisition data for the object: PpIX

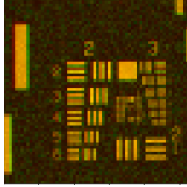
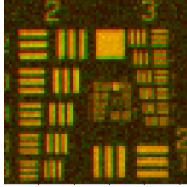
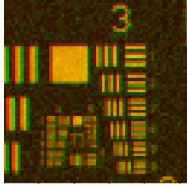
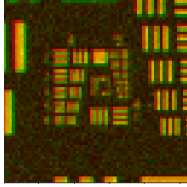
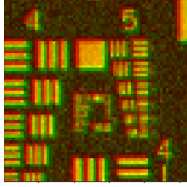
Color checker					
ID	Setup	Source	Filter	Info	Overview
615dee05 478214d8 c8a30661	v1.1	Leica	- No	- Signal = 900	

6328880e ebe9129a e9936eeb	v1.3	WLB	- Diffuser	- Signal = 12000	
63288a94 ebe9129a e9936f2b	v1.3	WLB	- Diffuser	- Signal = 6000	
63288861 ebe9129a e9936f0b	v1.3	WLB	- Diffuser	- Signal = 40000 - ti = 3ms	

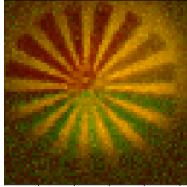
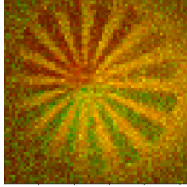
**Table S4.** List of acquisition data for the object: Color checker

USAF					
ID	Setup	Source	Filter	Info	Overview
615de901 478214d8 c8a30522	v1.1	WLL	- Diffuser	- Signal = 4000	
615de942 478214d8 c8a30548	v1.1	WLL	- Diffuser	- Signal = 3500	
615de97f 478214d8 c8a3056e	v1.1	WLL	- Diffuser	- Signal = 3500	
615de52e 478214d8 c8a302a0	v1.1	WLL	- Diffuse - OD=0.6	- Signal = 900	

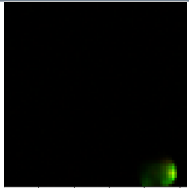
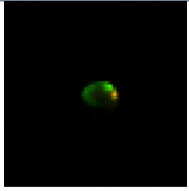
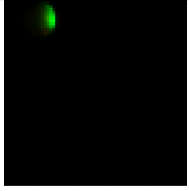
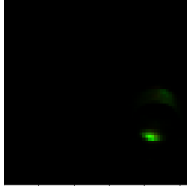
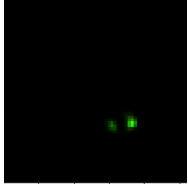
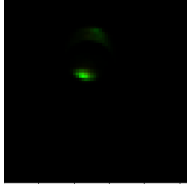
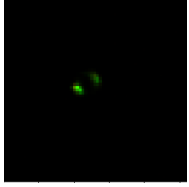
617288c2 478214d8 c8a30f42	v1.1	WLL	- Diffuser	- Signal = 2000 - zoom x1	
617289d2 478214d8 c8a30f5c	v1.1	WLL	- Diffuser	- Signal = 2000 - zoom x2	
61728b7d 478214d8 c8a30f76	v1.1	WLL	- Diffuser	- Signal = 2000 - zoom x3	
61728dde 478214d8 c8a30f90	v1.1	WLL	- Diffuser	- Signal = 2000 - zoom x3	
61728f62 478214d8 c8a30faa	v1.1	WLL	- Diffuser	- Signal = 2000 - zoom x4	
61729424 478214d8 c8a30fc4	v1.1	WLL	- Diffuser	- Signal = 2000 - zoom x6	
6172a77c 478214d8 c8a30fde	v1.1	WLL	- Diffuser	- Signal = 2000 - zoom x12	
61efc91f cdb6910b 899d016e	v1.3	WLL	- Diffuser	- Signal = 7000 - zoom x1	

61efd531 cdb6910b 899d018b	v1.3	WLL	- Diffuser	- Signal = 7000 - zoom x2	
61efd8c4 cdb6910b 899d01a8	v1.3	WLL	- Diffuser	- Signal = 3500 - zoom x3	
61efdc1b cdb6910b 899d01c5	v1.3	WLL	- Diffuser	- Signal = 3600 - zoom x4	
61efdfdc cdb6910b 899d01e2	v1.3	WLL	- Diffuser	- Signal = 3600 - zoom x6	
61f00973 cdb6910b 899d020a	v1.3	WLL	- Diffuser	- Signal = 3600 - zoom x12	

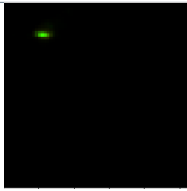
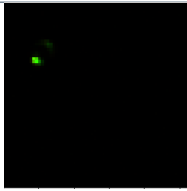
**Table S5.** List of acquisition data for the object: USAF

Colored Star Sector					
ID	Setup	Source	Filter	Info	Overview
61572176 29e3fc10 d47dc648	v1.1	WLL	- Diffuser	- Signal = 4000	
615de463 478214d8 c8a30190	v1.1	WLL	- Diffuser - OD=0.6	- Signal = 900	


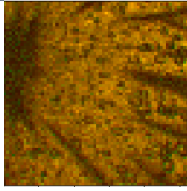
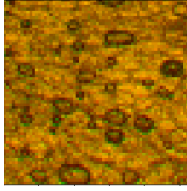
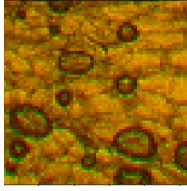
**Table S6.** List of acquisition data for the object: Colored Star Sector

No object					
ID	Setup	Source	Filter	Info	Overview
<a href="#">6172bca7</a> <a href="#">478214d8</a> <a href="#">c8a3102d</a>	v1.1	HgAr	- No	- Signal = 25000	
<a href="#">6172b473</a> <a href="#">478214d8</a> <a href="#">c8a30ff9</a>	v1.1	HgAr	- No	- Signal = 18000	
<a href="#">6172b95e</a> <a href="#">478214d8</a> <a href="#">c8a31013</a>	v1.1	HgAr	- No	- Signal = 28000	
<a href="#">61ba19b4</a> <a href="#">cdb6910b</a> <a href="#">899cffb8</a>	v1.2	HgAr	- No	- Signal = 70000	
<a href="#">61ba24a8</a> <a href="#">cdb6910b</a> <a href="#">899d0006</a>	v1.2	HgAr	- No	- Signal = 16000	
<a href="#">61ba1731</a> <a href="#">cdb6910b</a> <a href="#">899cff84</a>	v1.2	HgAr	- No	- Signal = 65000	
<a href="#">61ba20e8</a> <a href="#">cdb6910b</a> <a href="#">899cffd2</a>	v1.2	HgAr	- No	- Signal = 20000	


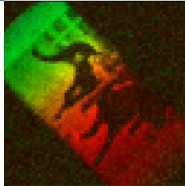


<a href="#">61ba183b</a> <a href="#">cdb6910b</a> <a href="#">899cff9e</a>	v1.2	HgAr	- No	- Signal = 30000	
<a href="#">61ba21db</a> <a href="#">cdb6910b</a> <a href="#">899cffec</a>	v1.2	HgAr	- No	- Signal = 11000	

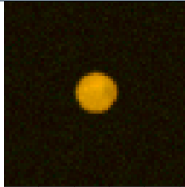
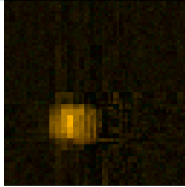
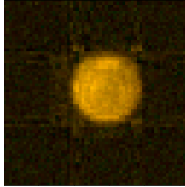
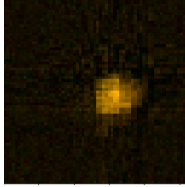
**Table S7.** List of acquisition data for the object: No object

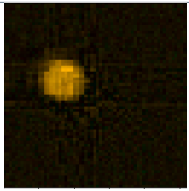
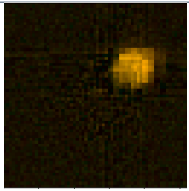
Tomato slice					
ID	Setup	Source	Filter	Info	Overview
<a href="#">61b07ee2</a> <a href="#">3f7ce79f</a> <a href="#">5e565c2c</a>	v1.2	WLL	- Diffuser	- Signal = 3500 - zoom x1	
<a href="#">61b07f56</a> <a href="#">3f7ce79f</a> <a href="#">5e565c46</a>	v1.2	WLL	- Diffuser	- Signal = 4000 - zoom x2	
<a href="#">61b080f8</a> <a href="#">3f7ce79f</a> <a href="#">5e565c60</a>	v1.2	WLL	- Diffuser	- Signal = 4000 - zoom x6	
<a href="#">61b0924b</a> <a href="#">3f7ce79f</a> <a href="#">5e565c7a</a>	v1.2	WLL	- Diffuser	- Signal = 4000 - zoom x12	

**Table S8.** List of acquisition data for the object: Tomato slice

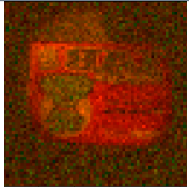

Horse					
ID	Setup	Source	Filter	Info	Overview
<a href="#">622b6347</a> <a href="#">43258e76</a> <a href="#">eab21767</a>	v1.3	WLL	- Diffuser	- Signal = 3000	
<a href="#">622b6387</a> <a href="#">43258e76</a> <a href="#">eab2178d</a>	v1.3	WLL	- Diffuser - LinearColor	- Signal = 1800	

**Table S9.** List of acquisition data for the object: Horse

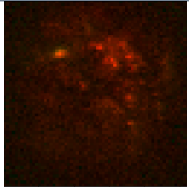
White spot					
ID	Setup	Source	Filter	Info	Overview
<a href="#">62ac73b0</a> <a href="#">b6497e39</a> <a href="#">456f4a40</a>	v1.3	WLL	- Diffuser	- Signal = 5000 - no motion	
<a href="#">62ac7786</a> <a href="#">b6497e39</a> <a href="#">456f4a97</a>	v1.3	WLL	- Diffuser	- Signal = 5000 - circular motion	
<a href="#">62ac7f41</a> <a href="#">b6497e39</a> <a href="#">456f4ad1</a>	v1.3	WLL	- Diffuser	- Signal = 5000 - open/close	
<a href="#">62ac783b</a> <a href="#">b6497e39</a> <a href="#">456f4ab4</a>	v1.3	WLL	- Diffuser	- Signal = 5000 - square motion	

62ac76a9 b6497e39 456f4a5d	v1.3	WLL	- Diffuser	- Signal = 5000 - Diag motion	
62ac7707 b6497e39 456f4a7a	v1.3	WLL	- Diffuser	- Signal = 5000 - Diag motion	

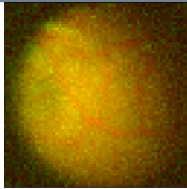
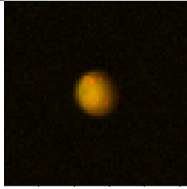
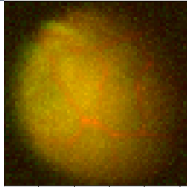
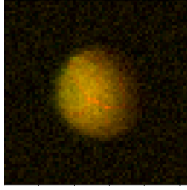
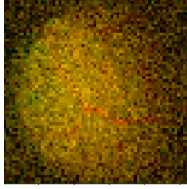
**Table S10.** List of acquisition data for the object: White spot

Thorlabs box					
ID	Setup	Source	Filter	Info	Overview
6328947d ebe9129a e9936fad	v1.3	WLB	- Diffuser	- Signal = 1500 - ti = 5ms	
6328942f ebe9129a e9936f8d	v1.3	WLB	- Diffuser	- Signal = 2500 - ti = 10ms	


**Table S11.** List of acquisition data for the object: Thorlabs box




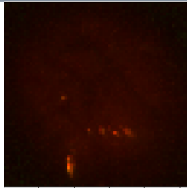
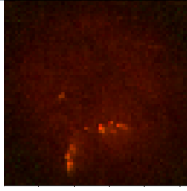
Blob					
ID	Setup	Source	Filter	Info	Overview
632b159c ebe9129a e993718f	v1.3	WLB	- Diffuser	- Signal = 10000 - zoom x4 - obj x40	

**Table S12.** List of acquisition data for the object: Blob

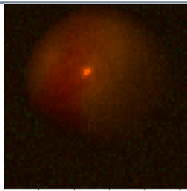
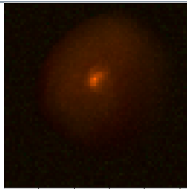
Tree leaf					
ID	Setup	Source	Filter	Info	Overview
<a href="#">632b2b6c</a> <a href="#">ebe9129a</a> <a href="#">e9937270</a>	v1.3	WLB	- Diffuser	- Signal = 6000 - zoom x4 - obj x40 - ti = 10ms	
<a href="#">632b23c4</a> <a href="#">ebe9129a</a> <a href="#">e99371f0</a>	v1.3	WLB	- Diffuser	- Signal = 14000 - zoom x1 - obj x40 - ti = 1ms	
<a href="#">632b2ada</a> <a href="#">ebe9129a</a> <a href="#">e9937250</a>	v1.3	WLB	- Diffuser	- Signal = 12000 - zoom x4 - obj x40 - ti = 20ms	
<a href="#">632b2647</a> <a href="#">ebe9129a</a> <a href="#">e9937210</a>	v1.3	WLB	- Diffuser	- Signal = 17000 - zoom x2 - obj x40 - ti = 5ms	
<a href="#">632b270b</a> <a href="#">ebe9129a</a> <a href="#">e9937230</a>	v1.3	WLB	- Diffuser	- Signal = 4000 - zoom x4 - obj x40 - ti = 5ms	

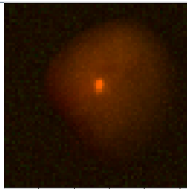
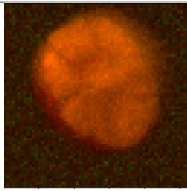
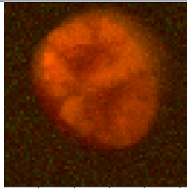
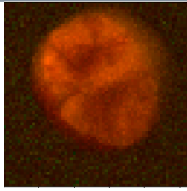
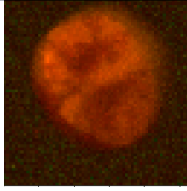
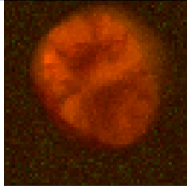
**Table S13.** List of acquisition data for the object: Tree leaf

Lamb brain					
ID	Setup	Source	Filter	Info	Overview
<a href="#">6350125e</a> <a href="#">4d15dd53</a> <a href="#">6ffceac9</a>	v1.3.1	WLZ	- Diffuser	- Signal = 22000 - no motion	

63501573 4d15dd53 6ffceae9	v1.3.1	WLZ	- Diffuser	- Signal = 35000 - motion:2.5mm	
635017f2 4d15dd53 6ffceb0a	v1.3.1	WLZ	- Diffuser	- Signal = 18000 - no motion	
63501a07 4d15dd53 6ffceb2a	v1.3.1	WLZ	- Diffuser	- Signal = 8000 - motion:2.5mm	
63501dc6 4d15dd53 6ffceb53	v1.3.1	WLZ	- Diffuser	- Signal = 12000	
63501f12 4d15dd53 6ffceb73	v1.3.1	WLZ	- Diffuser	- Signal = 9000	

**Table S14.** List of acquisition data for the object: Lamb brain

Apple					
ID	Setup	Source	Filter	Info	Overview
63750b69 4d15dd53 6f04819d	v1.3.1	WLZ	- HighPass 500nm - LowPass 750nm	- Signal = 10000	
63750cdd 4d15dd53 6f0481bd	v1.3.1	WLZ	- HighPass 500nm - LowPass 750nm	- Signal = 15000	

63750db9 4d15dd53 6f0481dd	v1.3.1	WLZ	- HighPass 500nm - LowPass 750nm	- Signal = 10000	
637511ef 4d15dd53 6f048227	v1.3.1	WLZ	- HighPass 500nm - LowPass 750nm	- Signal = 5000 - bitten apple - t = 0min	
637512e8 4d15dd53 6f048247	v1.3.1	WLZ	- HighPass 500nm - LowPass 750nm	- Signal = 5000 - bitten apple - t = 5min	
63751414 4d15dd53 6f048267	v1.3.1	WLZ	- HighPass 500nm - LowPass 750nm	- Signal = 5000 - bitten apple - t = 10min	
63751541 4d15dd53 6f048287	v1.3.1	WLZ	- HighPass 500nm - LowPass 750nm	- Signal = 5000 - bitten apple - t = 15min	
6375166c 4d15dd53 6f0482a7	v1.3.1	WLZ	- HighPass 500nm - LowPass 750nm	- Signal = 5000 - bitten apple - t = 20min	

**Table S15.** List of acquisition data for the object: Apple

### C. Metadata

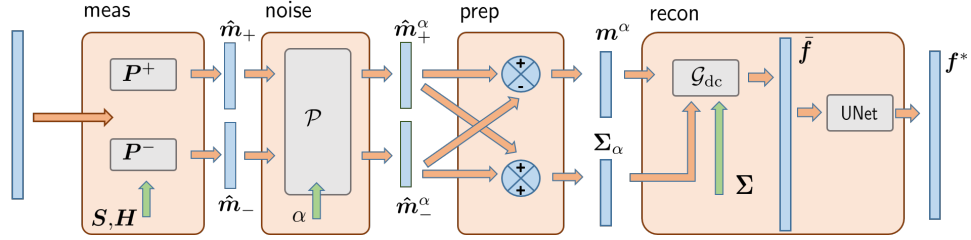
The metadata of each acquisition are visible in each acquisition folder directly and also present in the \*\_metadata.json file. They can be divided into four categories:

- **EXP:** metadata related to the experiment (e.g., object, source, filters).
- **ACQ:** metadata related to the acquisition parameters (e.g., image size, acquisition time).
- **SPECTRO:** metadata related to the spectrometer (e.g., integration time, saturation).
- **DMD:** metadata related to the digital micromirror device (DMD), e.g., number of patterns, micromirror tilt time.

## 2. DC-NET RECONSTRUCTIONS

### A. Algorithm

$$f \in [-1, 1]^N$$



**Fig. S1.** Overview of the DC-Net reconstruction algorithm as implemented using four specific SPYRIT core modules. *meas* represents the measurement operator, *noise* the noise model, *prep* the preprocessing step, and *recon* the reconstruction step.

### B. List of reconstructed samples, spectral channels, and spectral bins

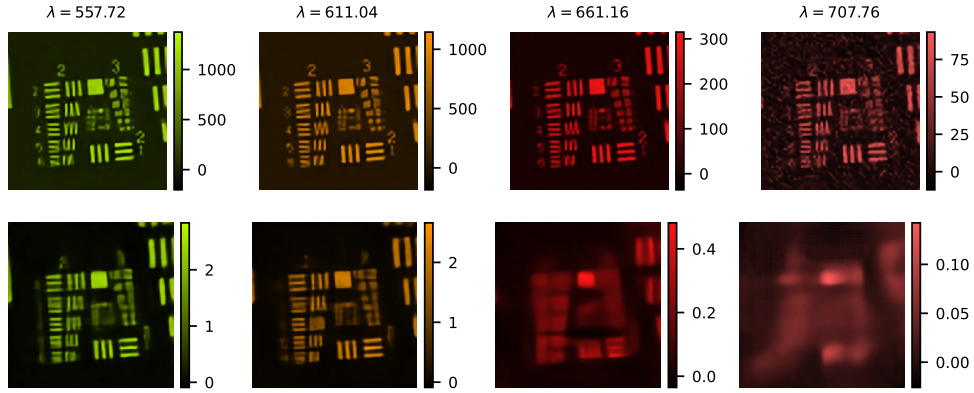
We consider the following samples

1. USAF  $\times 2$  zoom (see Sec. C).
2. USAF  $\times 12$  zoom (see Sec. D).
3. Star Sector  $\times 2$  zoom (see Sec. E).
4. Star Sector  $\times 12$  zoom (see Sec. F).
5. Colored Star Sector (see Sec. G).
6. Off-centered Star Sector (see Sec. H).
7. Tomato slice  $\times 2$  zoom (see Sec. I).
8. Tomato slice  $\times 12$  zoom (see Sec. J).
9. Cat (see Sec. K).
10. Colored cat (see Sec. L).
11. Horse (see Sec. M).
12. Apple (see Sec. N).
13. Color checker (see Sec. O).
14. Tree leaf (see Sec. P).
15. Thorlabs box (see Sec. Q).

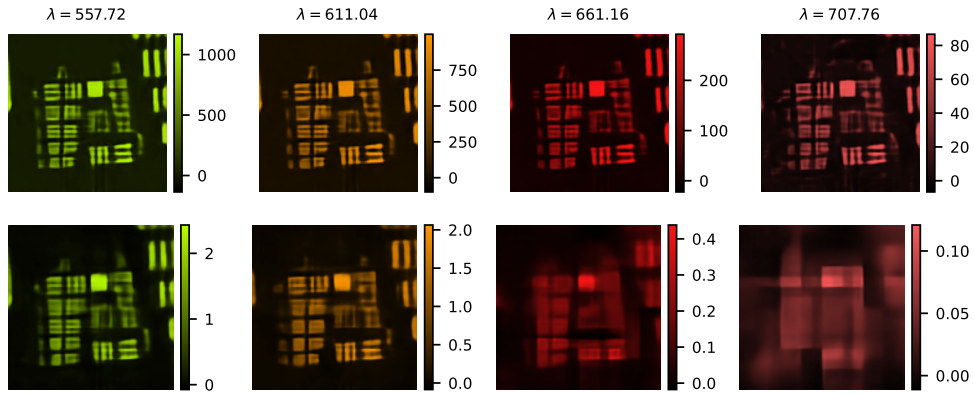
For each object in the above list, we consider the reconstruction of:

- Four spectral *channels* at  $\lambda = 557.7, 611.0, 661.2,$  and  $707.8$  nm.
- Four spectral *bins* that are obtained by summation of the spectral channels. The central wavelengths of the spectral bins are also  $\lambda = 557.7, 611.0, 661.2,$  and  $707.8$  nm, while their widths are  $54.7, 51.7, 48.3,$  and  $44.6$  nm, respectively.

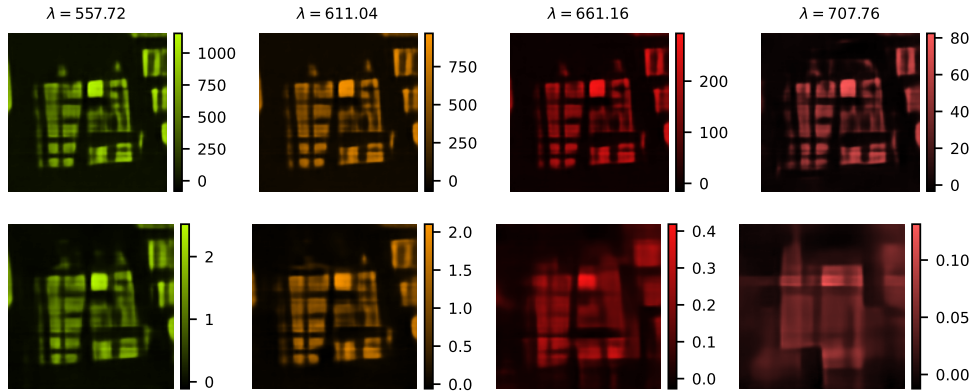
**C. USAF  $\times 2$  zoom**



**Fig. S2.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 4096$  measurements.



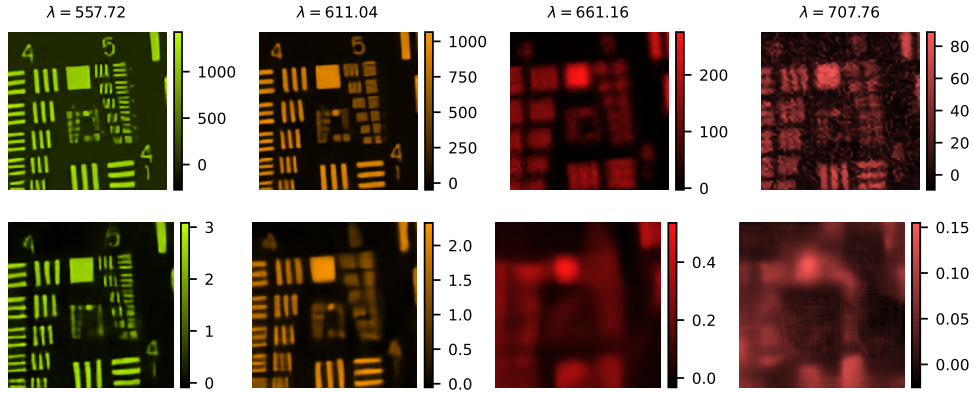
**Fig. S3.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 1024$  measurements.



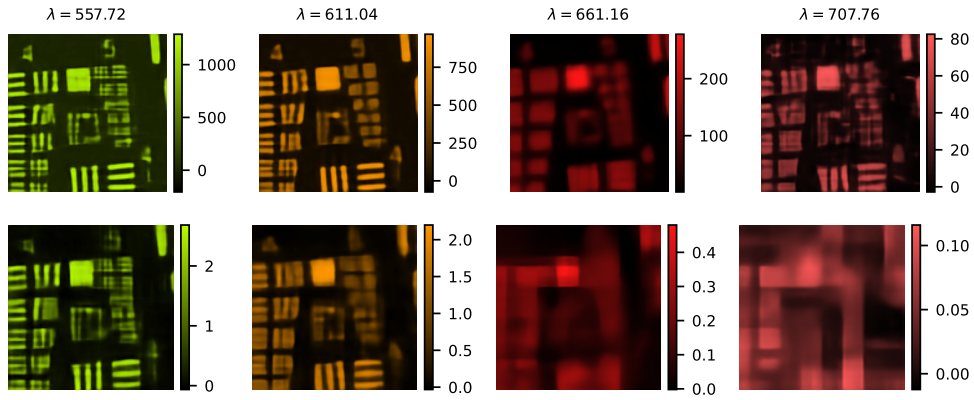
**Fig. S4.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 512$  measurements.



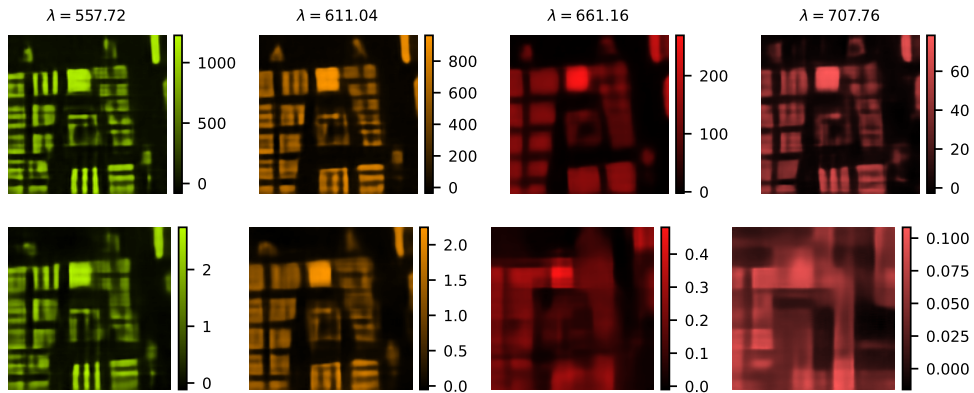
#### D. USAF $\times 12$ zoom



**Fig. S5.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 4096$  measurements.

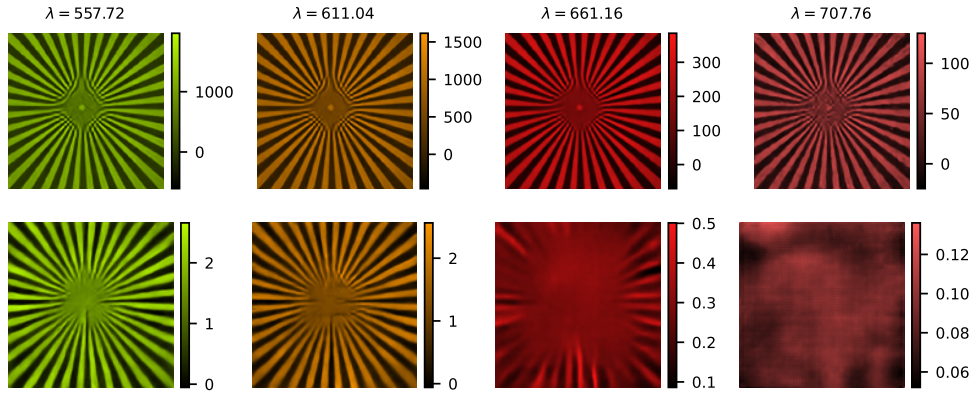


**Fig. S6.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 1024$  measurements.

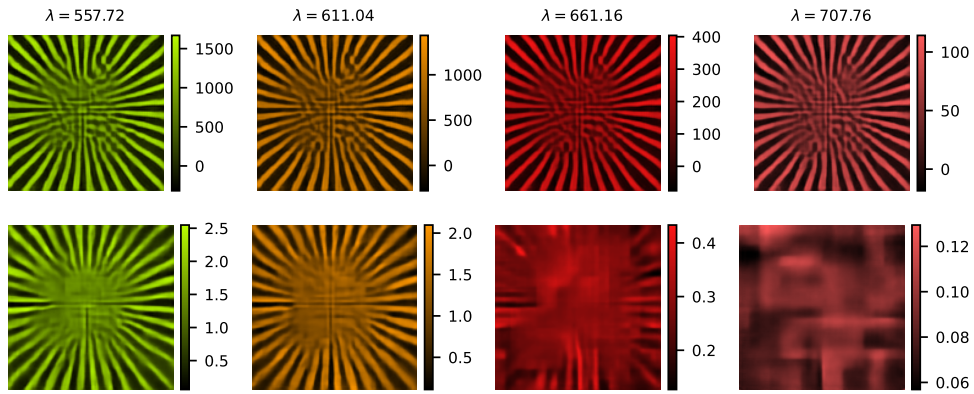


**Fig. S7.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 512$  measurements.

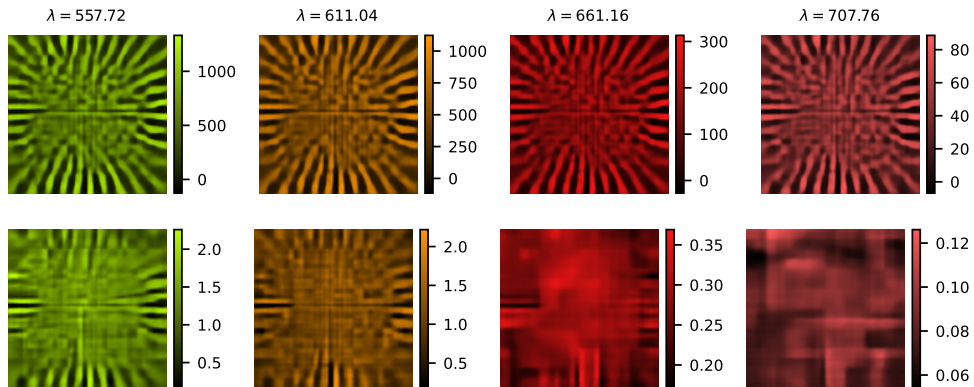
**E. Star sector  $\times 2$  zoom**



**Fig. S8.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 4096$  measurements.

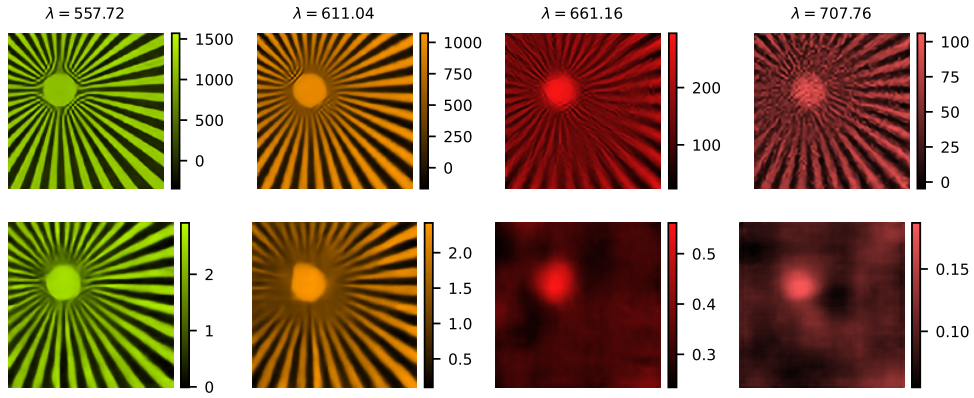


**Fig. S9.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 1024$  measurements.

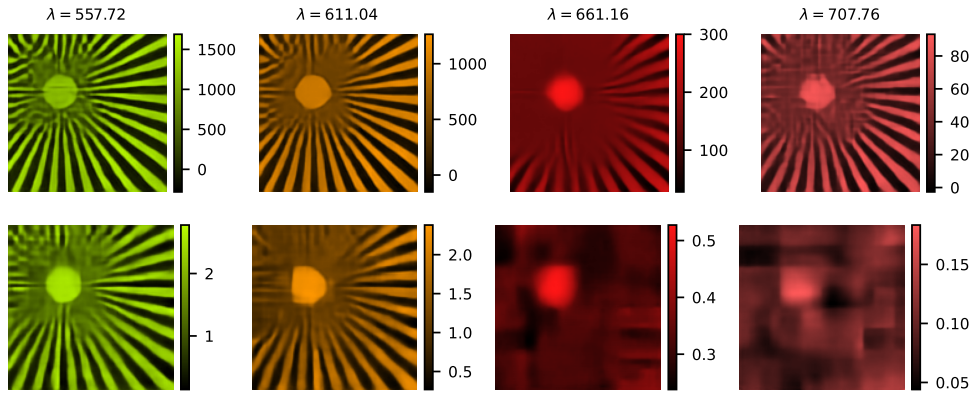


**Fig. S10.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 512$  measurements.

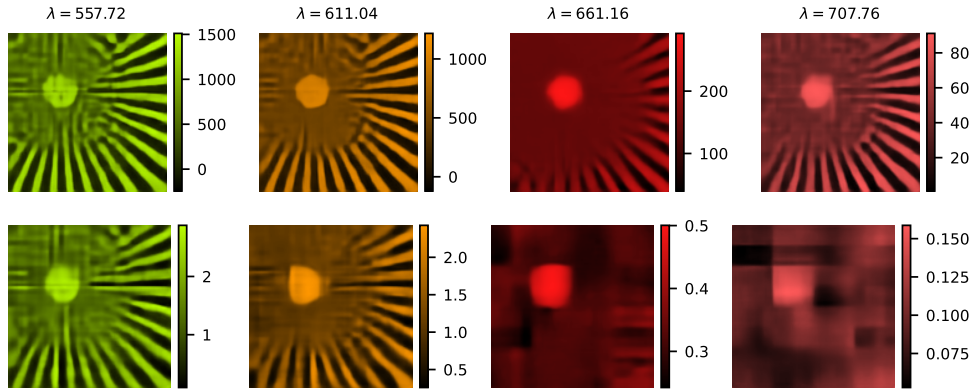
**F. Star sector  $\times 12$  zoom**



**Fig. S11.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 4096$  measurements.

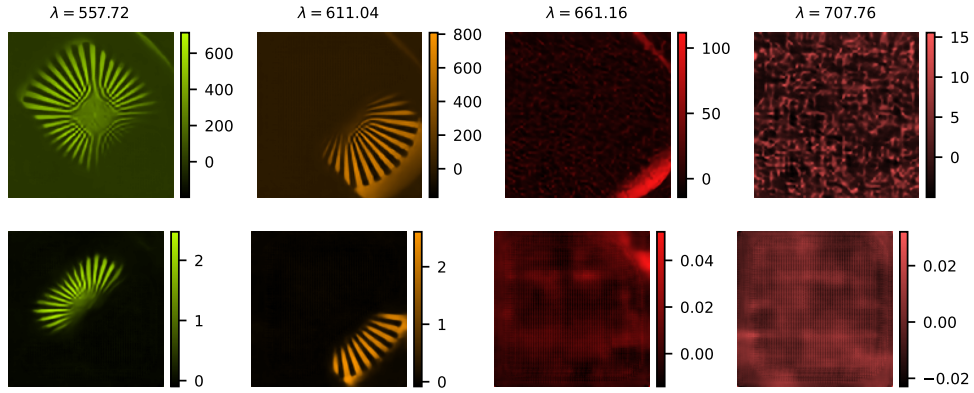


**Fig. S12.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 1024$  measurements.

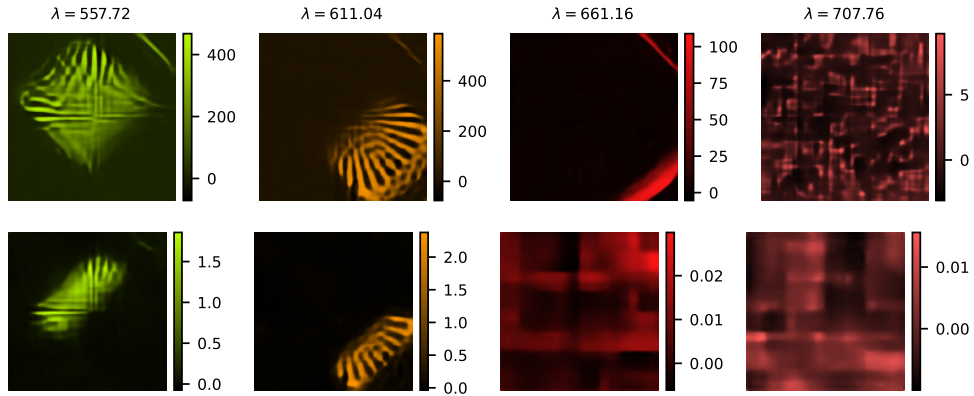


**Fig. S13.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 512$  measurements.

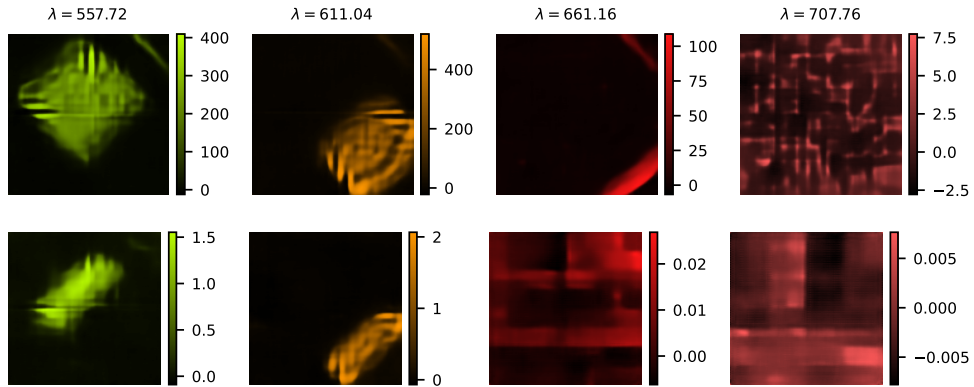
**G. Colored star sector**



**Fig. S14.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 4096$  measurements.

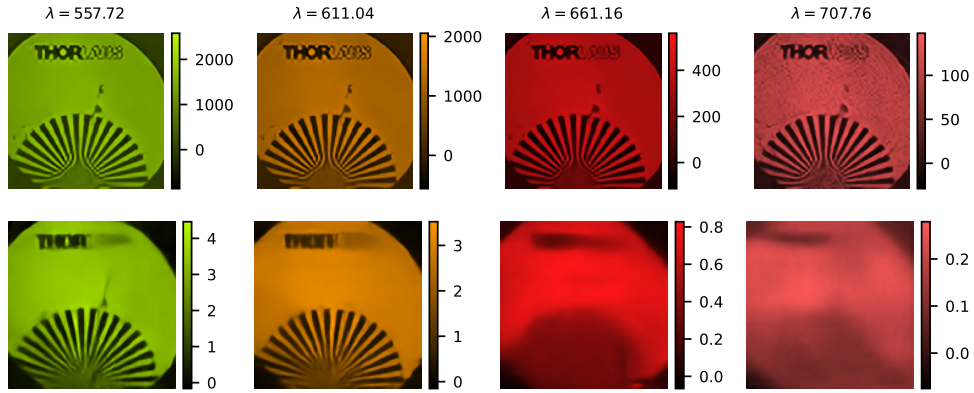


**Fig. S15.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 1024$  measurements.

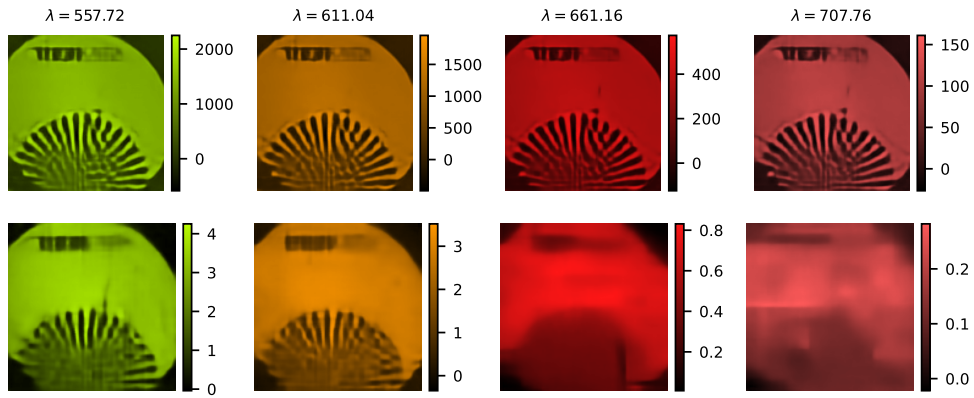


**Fig. S16.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 512$  measurements.

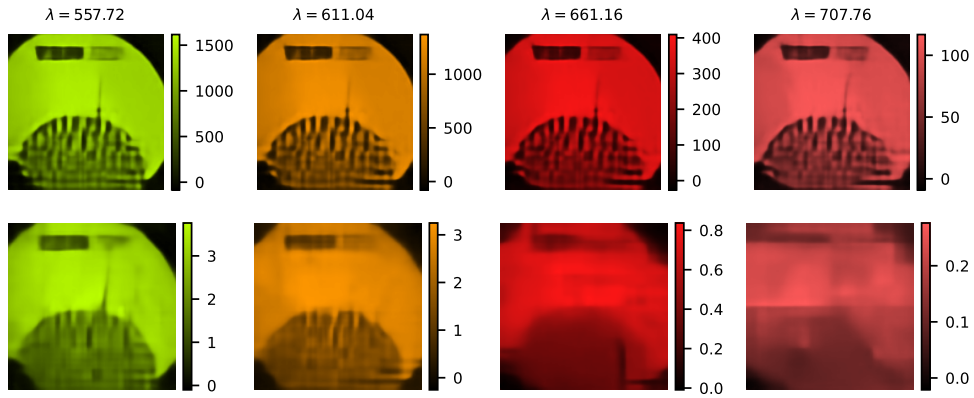
### H. Off centered star sector



**Fig. S17.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 4096$  measurements.

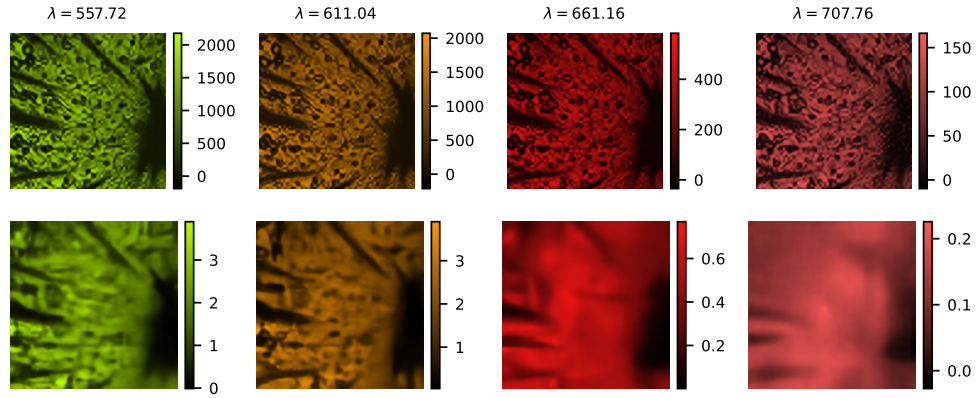


**Fig. S18.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 1024$  measurements.

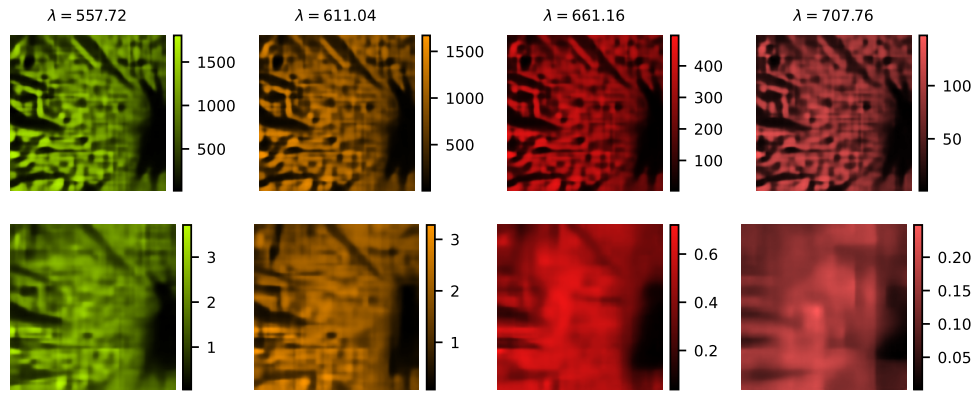


**Fig. S19.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 512$  measurements.

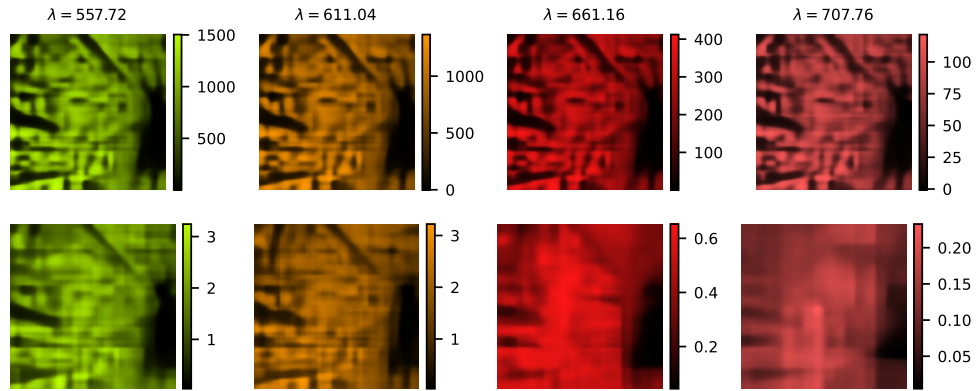
**I. Tomato slice  $\times 2$  zoom**



**Fig. S20.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 4096$  measurements.

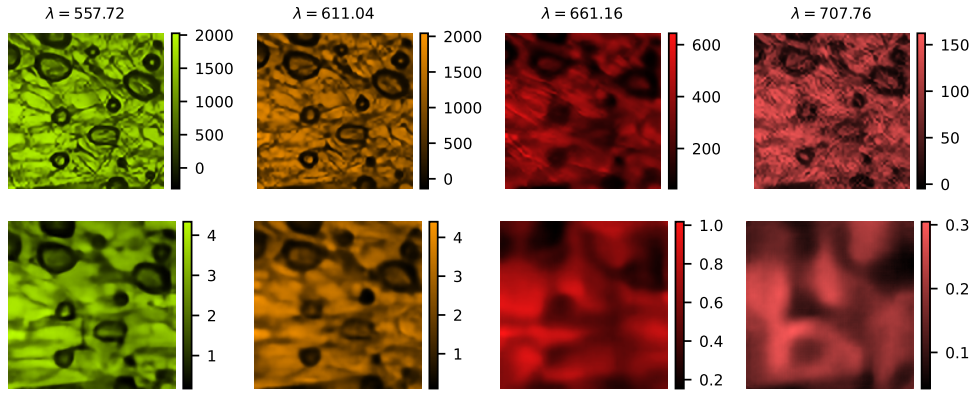


**Fig. S21.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 1024$  measurements.

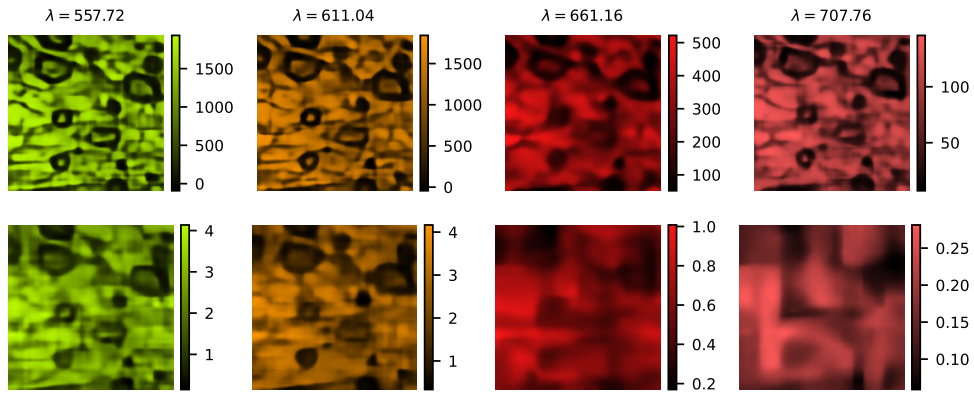


**Fig. S22.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 512$  measurements.

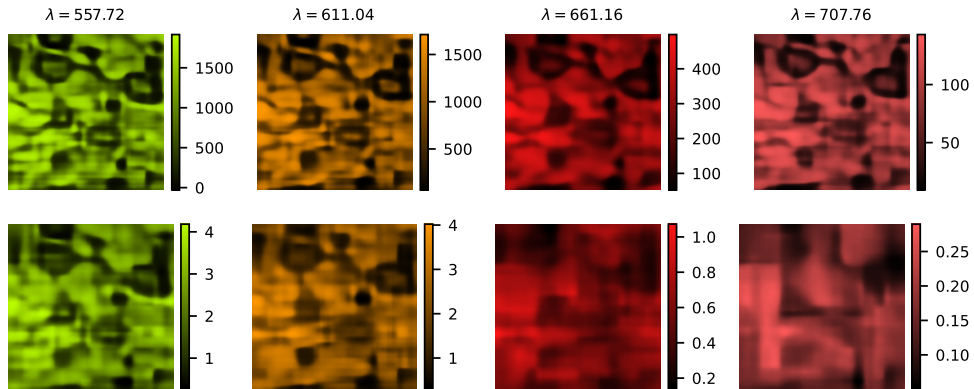
**J. Tomato slice ×12 zoom**



**Fig. S23.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 4096$  measurements.

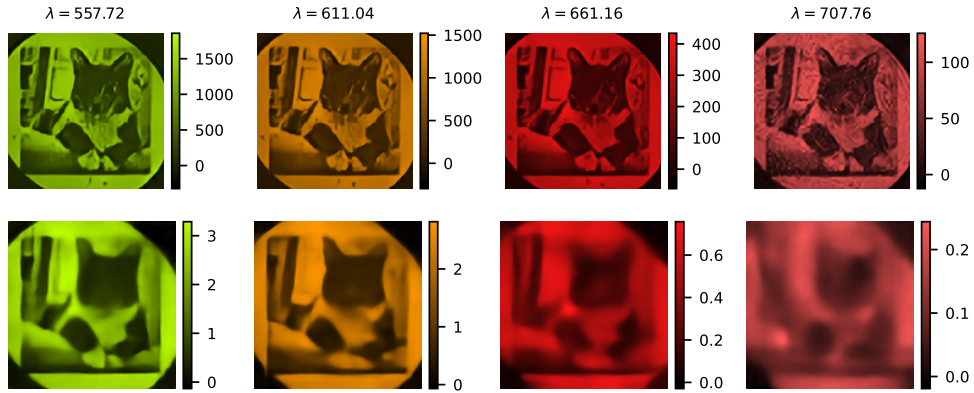


**Fig. S24.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 1024$  measurements.

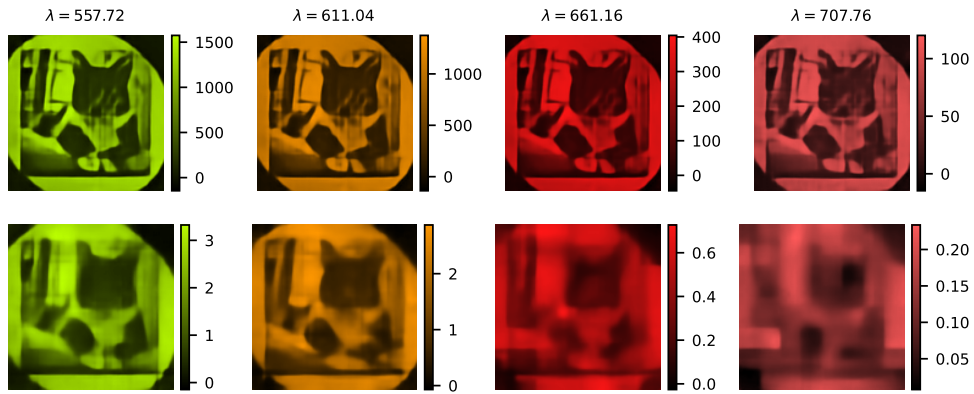


**Fig. S25.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 512$  measurements.

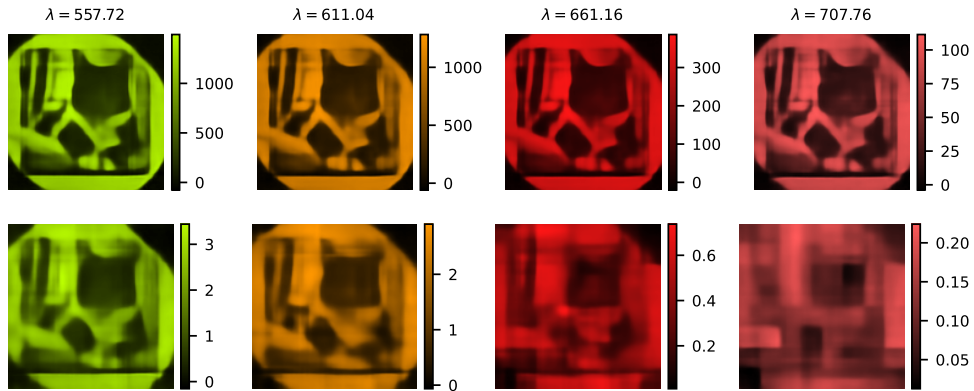
### K. Cat



**Fig. S26.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 4096$  measurements.



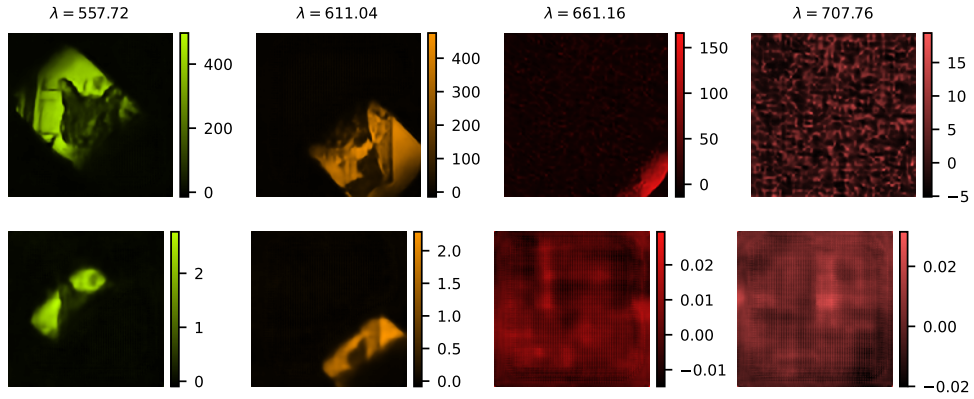
**Fig. S27.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 1024$  measurements.



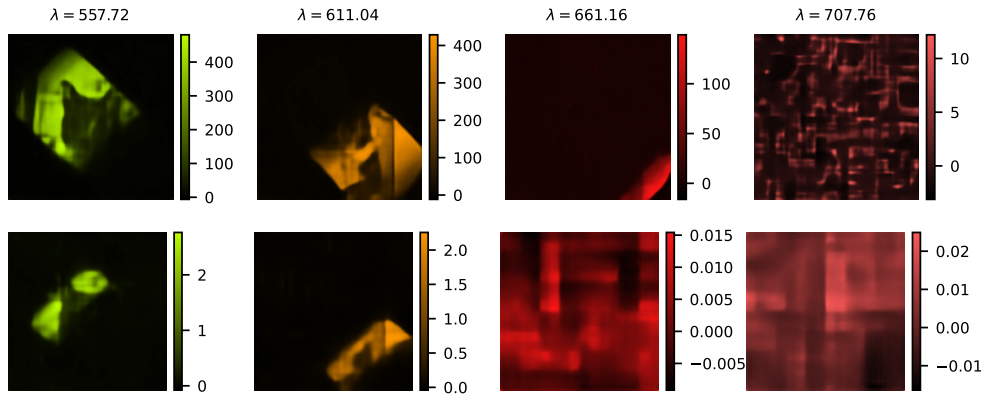
**Fig. S28.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 512$  measurements.



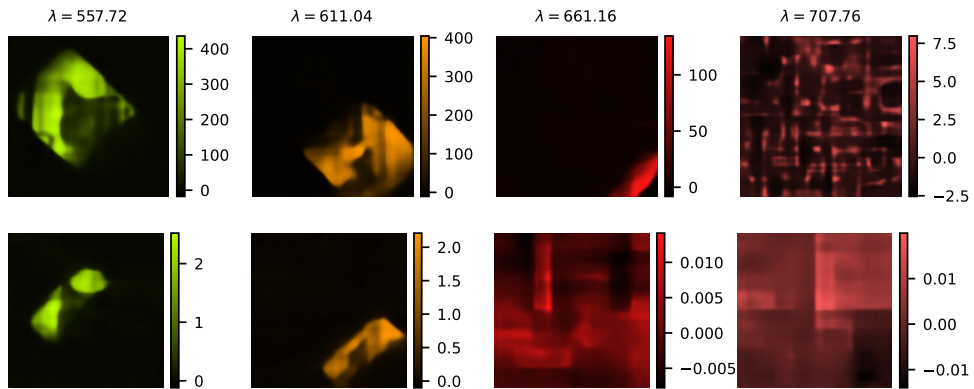
**L. Colored cat**



**Fig. S29.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 4096$  measurements.

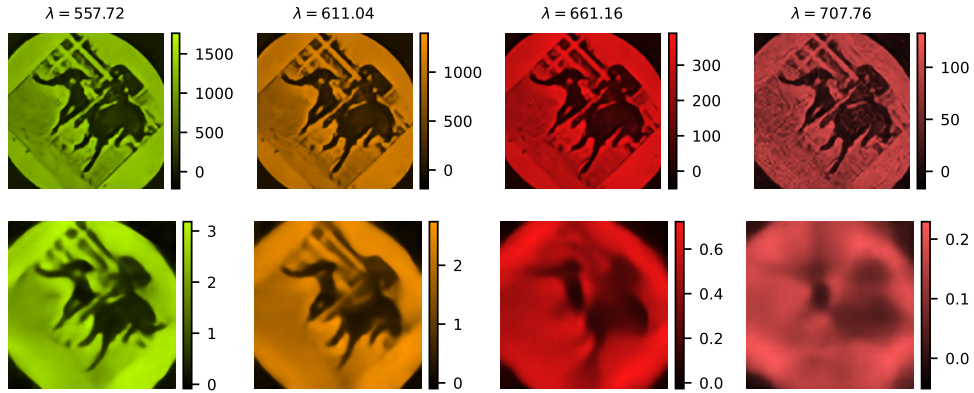


**Fig. S30.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 1024$  measurements.

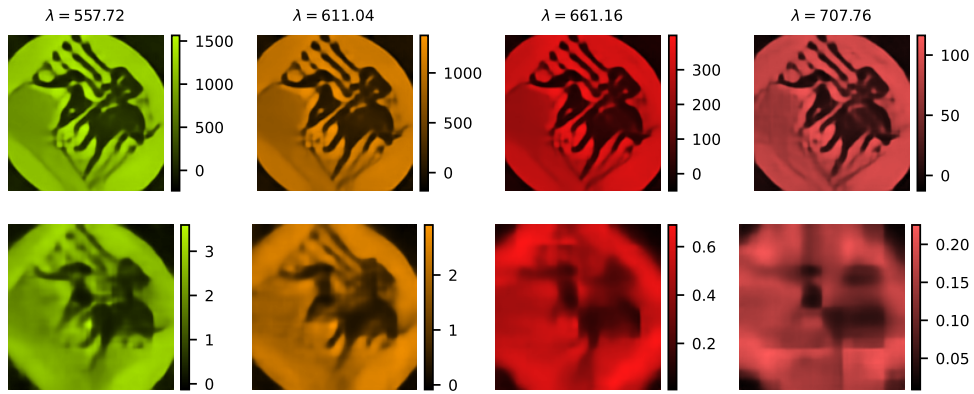


**Fig. S31.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 512$  measurements.

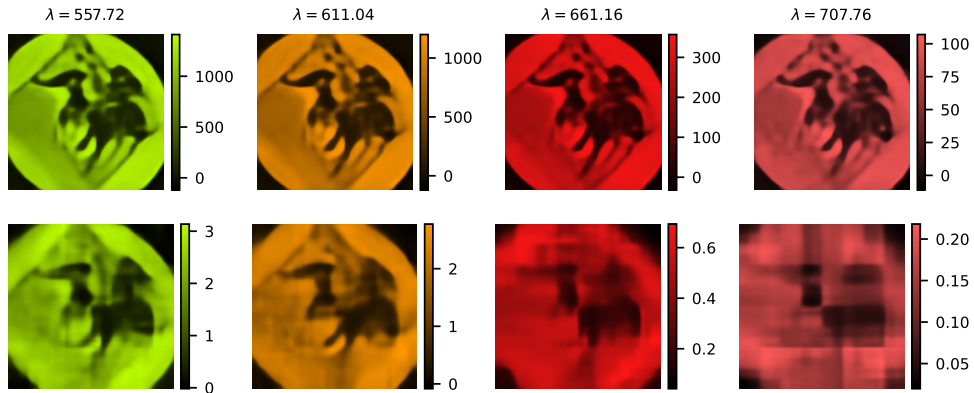
**M. Horse**



**Fig. S32.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 4096$  measurements.

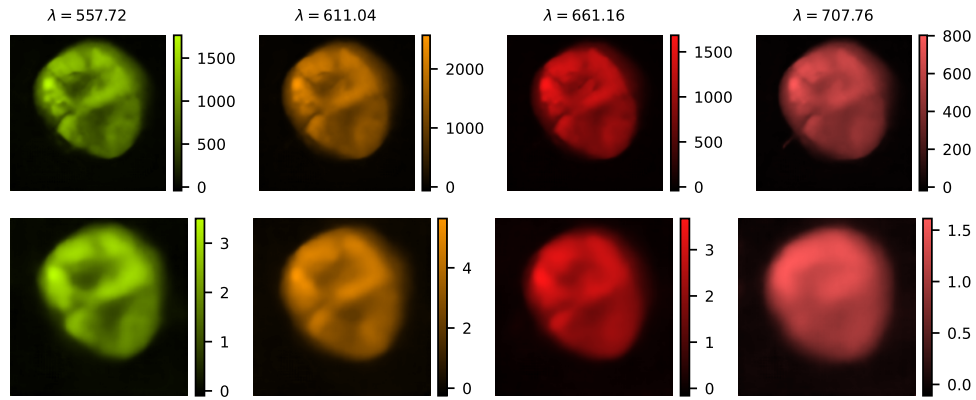


**Fig. S33.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 1024$  measurements.

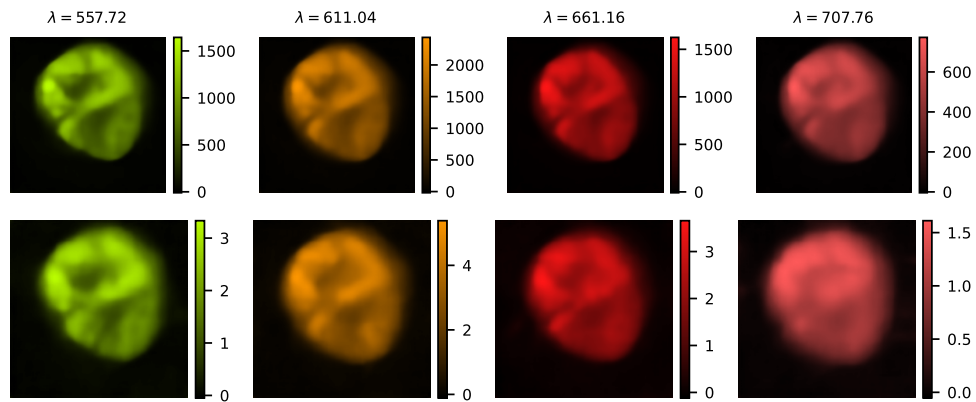


**Fig. S34.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 512$  measurements.

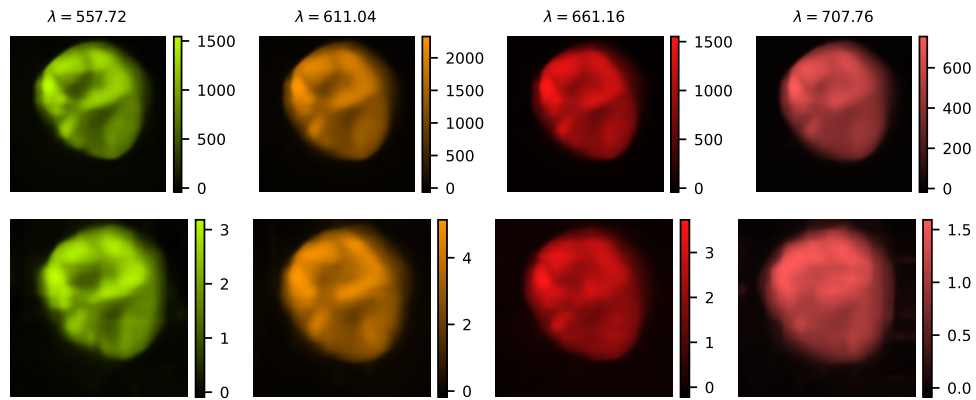
### N. Apple



**Fig. S35.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 4096$  measurements.

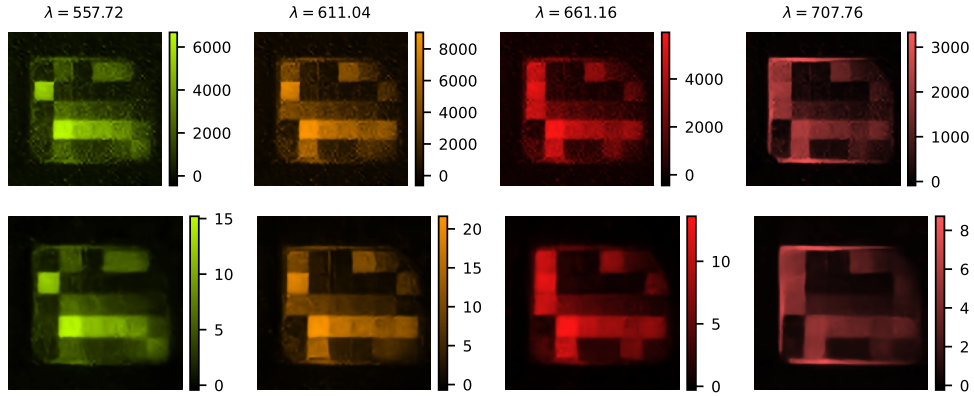


**Fig. S36.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 1024$  measurements.

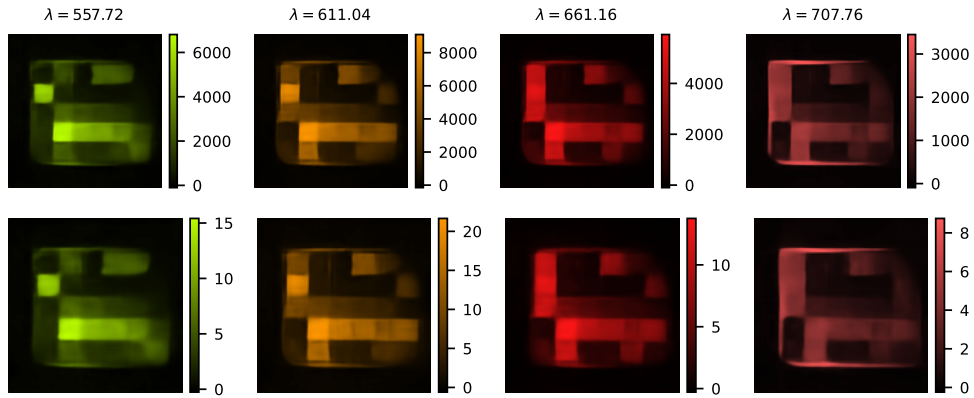


**Fig. S37.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 512$  measurements.

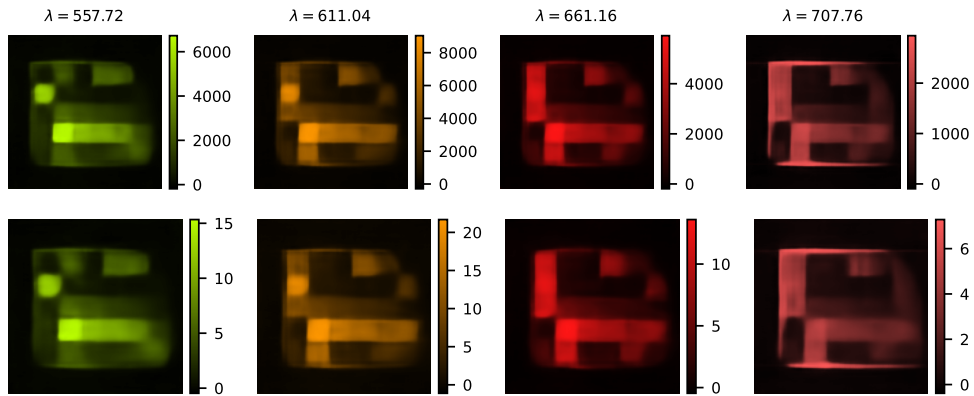
**O. Color checker**



**Fig. S38.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 4096$  measurements.

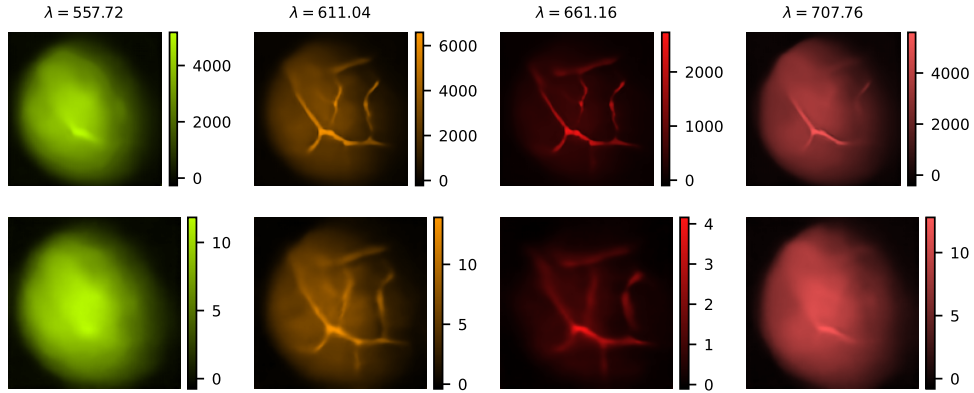


**Fig. S39.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 1024$  measurements.

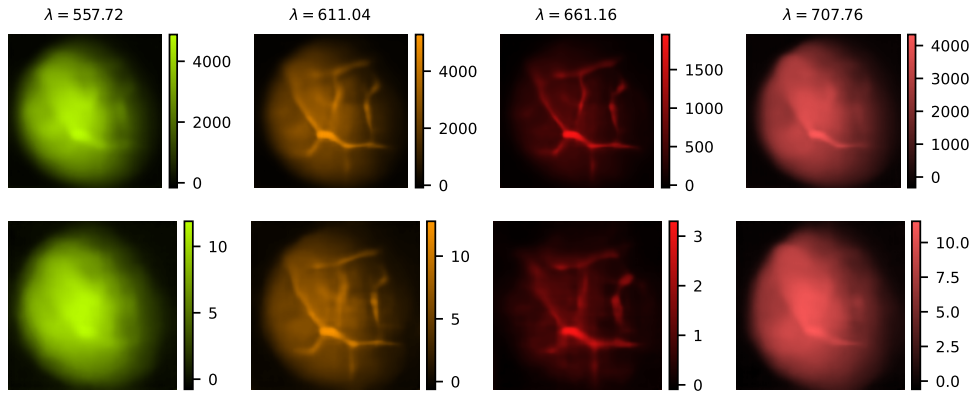


**Fig. S40.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 512$  measurements.

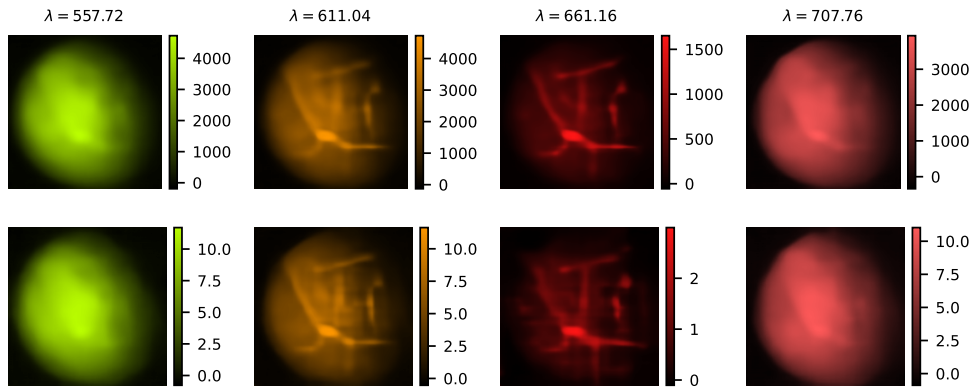
**P. Tree leaf**



**Fig. S41.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 4096$  measurements.

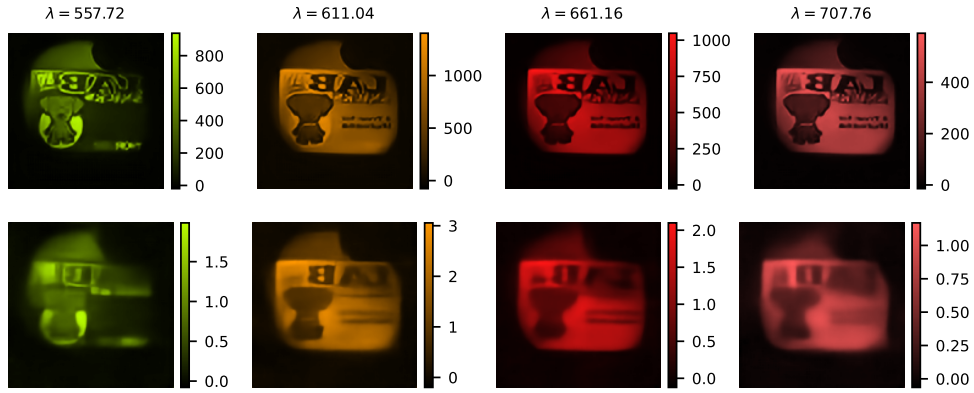


**Fig. S42.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 1024$  measurements.

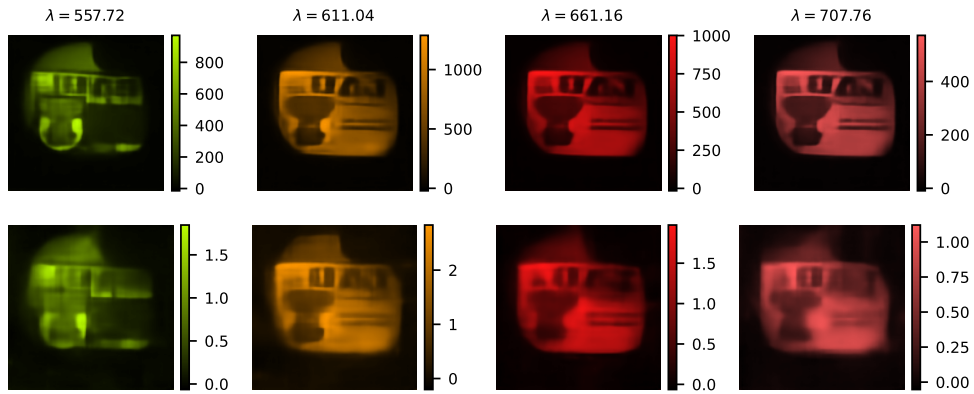


**Fig. S43.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 512$  measurements.

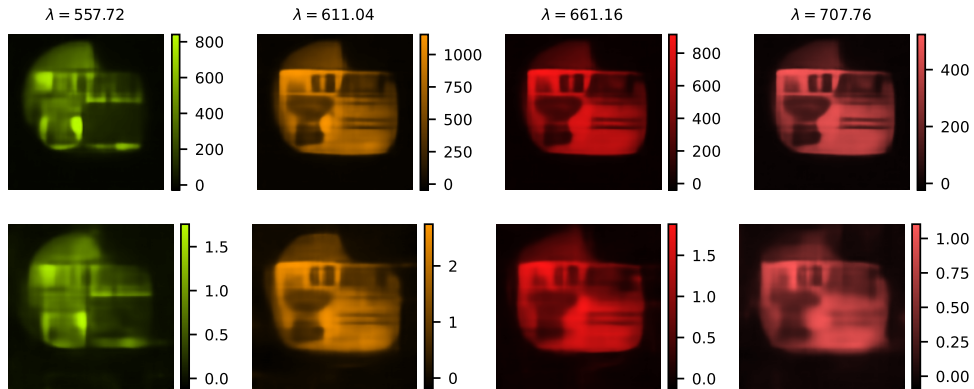
**Q. Thorlabs box**



**Fig. S44.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 4096$  measurements.



**Fig. S45.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 1024$  measurements.



**Fig. S46.** Reconstruction of four spectral bins (top) and channels (bottom) using a DC-Net trained for  $K = 512$  measurements.