

# Optimal Exoplanet Imagers Workshop

2023 Feb 20-24 @ Lorentz Center

Organisers: Leboulleux, Carlotti, Jensen-Clem, Kenworthy, N'Diaye



The “W-305” Optimal Exoplanet Imagers workshop at the Lorentz Center was a tremendous success, bringing together 46 international researchers at all career levels together to discuss new concepts and approaches for the direct detection and characterisation of terrestrial exoplanets around nearby stars.

Five reviews featuring 8 talks, all of which were given by junior researchers in the fields of coronagraphy, NCPA correction, algorithms, testbed software and biomarker signatures (5 women, 5 men and 1 non-binary researcher), set the scene for the discussions in the next three days. After brainstorming over a dozen possible breakout group topics, five groups were established: “Chasing rainbows with the Habitable Worlds Observatory”, “Visible extreme adaptive optics on extremely large telescopes: Towards detecting oxygen in Proxima b and analogs”, “Emerging technologies for high-contrast imaging from space”, “Harvesting lost photons in stellar coronagraphs”, and “Telemetry use in data post-processing”. The goal was to start writing white papers and SPIE Conference proceedings on these topics.

Notably, a refereed paper with the title “Observing rainbows with the Habitable Worlds Observer” is currently being written with an open science workflow:

<https://github.com/mkenworthy/HWObows>.

Three other SPIE papers were being proposed for follow up after the workshop with submissions of abstracts for the next SPIE conference (SPIE Optics & Photonics, San Diego, California, USA, 20-24 August 2023).

In addition, the fifth group has been building up a data challenge dedicated to students (master and PhD) with data that will be released by the Subaru telescope in Hawaii (USA).

All these deliverables have students as first authors and all participants as co-authors.

At the requests of the participants (in particular junior researchers), the workshop also touched on how to encourage diversity in the field, which has been predominantly white and male, and discussed strategies to encourage and grow our field in the next decade.

# Optimal Exoplanet Imagers

## Program

The workshop will happen the week of 20 February - 24 February 2023.

Day 1 Review talks on instrumentation and the search for life

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10:00 Opening of the workshop: introduction, organization

10:30 Review talk 1: On-sky NCPA correction: lessons learnt and limitations  
Examples from SCExAO, SPHERE, MAGAO-X, etc.  
Faustine Cantalloube (LAM), Maaïke van Kooten (UCSC)

11:30 Quick presentation on the organization of the first two days discussions,  
explanations on the use of post-its

12:00 *Lunch break*

14:00 Review talk 2: State of the art in coronagraphy:  
Where are we, where are we going, what are the needs and limitations?  
David Doelman (Leiden Obs.), Emiel Por (STScI)

15:00 Review talk 3: Designing new instruments:  
Examples from SPHERE+, METIS, LUVOIR, PCS, etc.  
Roser Juanola-Parramon (Goddard Space Flight Center), Sebastiaan  
Haffert (Univ. Arizona)

16:00 *Coffee break*

16:30 Free time for discussions and post-it filling

17:30 Organization of the team discussions and work  
Identification of the main 5 topics to address  
Work group splitting (possible evolution later on)

18:00 *Wine & Cheese reception*

Day 2 Key topics identification and first brainstorming sessions

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9:00 Review talk 4: How to look for life?  
Biomarker signatures, best targets, observation strategies...  
Nicolas Cowan (McGill Univ.), Kim Bott (UC Riverside)

10:30 *Coffee break*

11:00 Team work start

12:30 *Lunch break*

- 14:00 Review talks 5: Tools:  
Experimental testbeds, HCIPy and simulations, analytical models, machine learning  
Iva Laginja (Paris Obs.), Emiel Por (STScI), Olivier Herscovici-Schiller (ONERA),  
Jules Fowler (UCSC)
- 16:00 *Coffee break*
- 16:30 Team work

Day 3 Identification of required developments

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- 9:00 Team work
- 10:30 *Coffee break*
- 11:00 Team work
- 12:00 Presentations from break out groups to all groups  
Sum up of identified problematics, possible approaches/studies/methodologies,  
possible solutions, limitations, and needs. Discussion and feedbacks from other  
groups are encouraged to propose another perspective
- 12:30 *Lunch break*
- 14:00 Team work
- 16:00 *Coffee break*
- 16:30 Team work
- 17:30 Presentations from break out groups to all groups
- 19:00 *Workshop dinner*

Day 4 Suggestions of methods and tools

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- 9:00 Team work
- 10:30 *Coffee break*
- 11:00 Team work
- 12:00 Presentations from break out groups to all groups
- 12:30 *Lunch break*
- 14:00 Team work
- 16:00 *Coffee break*
- 16:30 Team work
- 17:30 Presentations from break out groups to all groups

Day 5 Conclusions and organization for future work and collaborations

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9:00 Conclusions of team work

10:30 *Coffee break*

11:00 Sum up presentations + future work and outcome organization  
Set up of collaborations/working groups  
Organization of paper writing

12:30 *Lunch break*

14:00 Review talk 6: The search for extra-terrestrial life: a Solar System approach  
Caroline Freissinet (LATMOS)

15:00 Free timeslot for discussions

16:30 End of workshop

# LORENTZ CENTER MEETING BUDGET SHEET 2022



Please fill in the appropriate values in the blue cells

Anticipated number of participants (including organizers, Max. 55@O/25@S)  
 Number of meeting days

Number

Euro

55
5

## A. Meeting Budget

- 1 Lorentz Center Funding (for workshop from January 2022)  
 Allows for reimbursement of accommodation, travel and/or lunches,  
 to be assigned by the scientific organizers.

6 875
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*In addition, the Lorentz Center covers the costs for refreshments,  
 wine and cheese party, workshop dinner, poster, facilities and support.*

- 2 External funding (please apply a.s.a.p.)  
*ERC EXACT (PI: Alexis Carlotti)*  
*ASHRA/NOVA/NWO funding*  
*Fill in: funding agency, current status and amount*  
*Fill in: funding agency, current status and amount*  
*Fill in: funding agency, current status and amount*

Funding status:	
Confirmed	
Confirmed	

4 500
4 000
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0
0

### TOTAL BUDGET

15 375
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## B. Meeting Costs

- 1 Number of participants with hotel refund (€ 98/night \*)  
 TOTAL hotel refunds
- 2 Number of participants with travel refund within Europe (€ 300 max.)  
 Number of participants with travel refund outside Europe (€ 800 max.)  
 TOTAL travel refunds
- 3 Lunch vouchers (€ 13/p.p.p.d.): 1='YES' 0='NO'
- 4 Other items  
*Fill in: item and amount*  
*Fill in: item and amount*  
*Fill in: item and amount*  
*Fill in: item and amount*

11
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6 300
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3 575
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### TOTAL COSTS

15 265
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\*=Prices subject to change

## C. ACCOUNT BALANCE (aim:zero)

110
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