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# TOMAS STOLKER

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## CONTACT DETAILS

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## RESEARCH & EXPERIENCE

**Leiden University, Veni laureate** 2020 — now  
Project title: *Unveiling formation signatures in the atmospheres of directly imaged exoplanets*

**ETH Zurich, ETH fellow** 2018 — 2020  
Project title: *Tracing the pathway of giant planet formation with high-contrast imaging*

**ETH Zurich, postdoctoral researcher** 2017 — 2020  
Research topics: 

- High-contrast imaging observations of self-luminous exoplanets and brown dwarfs at 4–5 micron.
- Processing, analysis and calibration of high-contrast imaging data.
- Atmospheric characterization of directly imaged planets.
- High-contrast infrared polarimetry and modeling of substellar companions with cloudy atmospheres and circumsubstellar disks.
- Direct imaging searches for gas giant planets in the NIR and accreting protoplanets in H $\alpha$ .

**University of Amsterdam, PhD student** 2013 — 2017  
Thesis title: *Protoplanetary disks and exoplanets in scattered light*  
Defense date: 7 September 2017  
Supervisors: Prof. Dr. C. Dominik, Prof. Dr. L. B. F. M. Waters, Dr. M. Min  
Research topics: 

- Polarimetric differential imaging observations of protoplanetary disks with VLT/SPHERE.
- Disk morphologies, dust properties, and shadowing variability.
- Radiative transfer simulations of protoplanetary disks and self-luminous exoplanets.

**University of Amsterdam, master thesis** 2012 — 2013  
Thesis title: *Twisted light from Kerr black holes*  
Supervisors: Dr. A. Patruno & Prof. Dr. S. B. Markoff  
Research topics: 

- Orbital angular momentum of light and rotating black holes.
- Relativistic raytracing computations in Kerr spacetime.

- Construction, laboratory measurements, and on-sky testing of an optical instrument for sorting of orbital angular momentum modes.

**SURFsara, junior technical consultant** 2012 — 2013

Company: SURFsara provides computational systems and services to support academic research.

Work: Development and programming of a token pool system to optimize the processing of jobs by a grid infrastructure.

## EDUCATION

Astronomy & Astrophysics, Master of Science 2010 — 2013  
*University of Amsterdam, The Netherlands*  
 Graduation date: 26 August 2013

Piano Jazz & Pop 2008 — 2010  
*Utrecht Conservatory, The Netherlands*

Physics & Astronomy, Bachelor of Science 2005 — 2008  
*University of Amsterdam, The Netherlands*  
 Graduation date: 10 October 2008

## FUNDING & AWARDS

2020 NWO Veni grant (EUR 250,000)  
 2017 ETH Zurich Postdoctoral Fellowship (EUR 190,000)  
 2016 LKBF travel funding for a work visit (EUR 550)  
 2014 LKBF travel funding for a conference visit (EUR 400)  
 2013 Award for the best astronomy thesis at the University of Amsterdam

## TEACHING EXPERIENCE

Supervision of bachelor and master theses 2018 — 2019  
*ETH Zurich, Switzerland*

Supervision of 1 bachelor and 1 master students with research project on high-contrast imaging data analysis and atmospheric characterization of directly imaged planets.

Teaching assistant 2017 — 2020  
*ETH Zurich, Switzerland*

Teaching tutorial classes for astronomy courses.

Supervision bachelor theses 2015 — 2016  
*University of Amsterdam, The Netherlands*

Supervision of 2 bachelor students with research projects on radiative transfer simulations of disks and exoplanets.

Teaching assistant 2012 — 2016  
*University of Amsterdam, The Netherlands*

Teaching tutorial classes for three astronomy courses, supervision of students with their observational practicum, and providing organizational and administrative support for the lectures.

## SOFTWARE DEVELOPMENT

<i>species</i>	Toolkit for atmospheric characterization of directly imaged exoplanets <a href="https://github.com/tomasstolker/species">https://github.com/tomasstolker/species</a>
<i>PynPoint</i>	Pipeline for processing and analysis of high-contrast imaging data <a href="https://github.com/PynPoint/PynPoint">https://github.com/PynPoint/PynPoint</a>
<i>diskmap</i>	Scattered light mapping of protoplanetary disks <a href="https://github.com/tomasstolker/diskmap">https://github.com/tomasstolker/diskmap</a>
<i>ARTES</i>	3D Monte Carlo scattering radiative transfer in planetary atmospheres <a href="https://github.com/tomasstolker/ARTES">https://github.com/tomasstolker/ARTES</a>

## ADMINISTRATION AND OUTREACH

2017 — 2020	Organizing of the weekly literature meeting in the Exoplanets & Habitability group at ETH Zurich.
2017	News item at <i>NOS op 3</i> for the Dutch Broadcasting Foundation.
2014 — 2017	Assisting with outreach activities such as open days and stargazing nights at the Anton Pannekoek Institute.
2014 — 2017	Organizing the weekly Exoplanets & Disks Meeting at the University of Amsterdam.

## OBSERVATIONAL PROGRAMS

PI: Stolker, VLT/SPHERE, 3 hours  
*Gas giant planets in recently dispersed circumstellar environments*

PI: Stolker, VLT/NACO, 30 hours  
*MIRACLES: Mid-InfraRed Atmospheric Characterization of Long-period Exoplanets and Substellar companions*

PI: Stolker, VLT/SPHERE, 3 hours  
*Hunting for young gas giants in recently dispersed circumstellar environments*

PI: Stolker, VLT/NACO, 51 hours  
*Breaking atmospheric degeneracies of planetary mass companions with 4–5  $\mu\text{m}$  photometry*

PI: Stolker, VLT/SPHERE, 6.1 hours  
*Probing the dusty atmospheres of brown dwarf companions with high-contrast polarimetry*

PI: Stolker, VLT/SPHERE, 12 hours

*A deep search for accreting protoplanets in large dust gaps of protoplanetary disks*

PI: Stolker, VLT/SPHERE, 3 hours

*Hunting for young gas giants in recently dispersed circumstellar environments*

PI: Stolker, VLT/SPHERE, 12 hours

*A deep search for accreting protoplanets in large dust gaps of protoplanetary disks*

PI: Stolker, VLT/SPHERE, DDT, 3 hours

*Shadows cast on the HD 135344B disk: towards constraints on inner disk variability*

PI: Stolker, REM, DDT, monitoring

*Photometric and scattered light variability of HD 135344B: probing the innermost disk regions*

PI: Stolker, VLT/SPHERE, 0.6 nights

*Shadow variability as a probe for inner disk dynamics of HD 135344B*

## **TALKS & POSTERS**

Talk: *species: a toolkit for spectral and photometric analysis of directly imaged planets*

ExoGRAVITY workshop: reaching exoplanets with interferometry

MPE Garching, Germany, 21-22 January 2020

Talk: *Dusty imprints of self-luminous atmospheres and circumplanetary disks on polarized light*

Directly Imaging Exoplanets in Polarized Light with ELTs, Lorentz Center, Leiden, 02–06

December 2019

Talk (invited): *Atmospheric characterization of planetary and substellar companions at 4-5 micron and in polarized light*

Institut de Planétologie et d'Astrophysique de Grenoble, 14 November 2019

Poster: *MIRACLES: atmospheric characterization of planetary and substellar companions at 4–5 micron*

Spirit of Lyot Conference, Tokyo, 21–25 October 2019

Talk: *Unveiling the formation sites of directly imaged planets in scattered light*

Exoplanets and planet formation, Tsung-Dao Lee Institute Shanghai, 12 December 2017

Poster: *Inner disk variability of HD 135344B revealed with multi-epoch scattered light imaging*

MPIA Ringberg meeting, Germany, 24-28 April 2017

Talk: *Protoplanetary disks and gas giant atmospheres in polarized scattered light*

ETH Zurich, 20 January 2017

Talk: *Shadows cast on the transition disk of HD 135344B*

Resolving planet formation in the era of ALMA and extreme AO, Santiago, 18 May 2016

Talk: *Shadows cast on the protoplanetary disk of HD 135344B*

ESO Vitacura, Santiago, 12 May 2016

Talk: *Shadows cast on the transition disk of HD 135344B*

Departamento de Astronomía, Universidad de Chile, 11 May 2016

Talk: *High-contrast scattered light imaging*

Poster: *Shadows cast on the transition disk of HD 135344B*

Protoplanetary discussions, Edinburgh, 10 March 2016

Talk: *Exoplanet atmospheres* (public outreach)

Public observatory Amsterdam, 21 April 2015

Talk: *Polarimetric study of Saturn's atmosphere with a new 3D radiative transfer code for (exo)planetary science*

Atmosphere science in the context of CHEOPS, TESS, K2 and PLATO, DLR Berlin, 2 March 2015

Talk: *Characterizing planetary atmospheres through polarimetry*

Anton Pannekoek Institute for Astronomy, 11 December 2014

Poster: *A new radiative transfer code for exoplanet atmospheres*

Characterizing planetary systems across the HR diagram, Cambridge, July 2014

Talk: *The solar system* (public outreach)

Amsterdam centre for photography, 04 October 2014