

Max Mahlke

PHD IN ASTRONOMY · MINOR BODIES OF THE SOLAR SYSTEM

☎ (+33) 645 796 726 | ✉ max.mahlke@ias.u-psud.fr | 🏠 github.com/maxmahlke

Education

PhD in Astronomy

OBSERVATOIRE DE LA CÔTE D'AZUR · SUPERVISOR: BENOIT CARRY

Nice, France

Oct. 2019 - Sept. 2022

- Thesis title *Asteroid Taxonomy: A Probabilistic Synthesis of Spectrometry and Albedo from Complete and Partial Observations* 📄
- Derived a new asteroid taxonomy from reflectance spectroscopy and albedos using a novel machine learning approach
- Studied the composition of Main Belt asteroids in the context of planetary formation

Master of Science in Physics

RWTH AACHEN UNIVERSITY · GRADUATED WITH DISTINCTION

Aachen, Germany

2014 - 2017

- Thesis title *Probing the Periodicity of Active Galactic Nuclei with the First G-APD Cherenkov Telescope* 📄
- Courses included *Astronomy and Astrophysics* and *Laboratory Course in Astronomy*
- 2015-2016: Erasmus stay at the *Universidad Autónoma de Madrid* in Master of Theoretical Physics: Astrophysics and Physics of the Cosmos
- Courses included *Radiative Processes in Astrophysics*, *Observational Techniques in Astrophysics*, and *Computational Astrophysics*

Bachelor of Science in Physics

RWTH AACHEN UNIVERSITY

Aachen, Germany

2011 - 2014

- Thesis title *Stabilization of Imaging Acquisition Techniques using Field Cancellation* 📄
- Courses covered *Experimental Physics* and *Theoretical Physics*

Research Experience

Institut d'Astrophysique Spatiale

POST-DOCTORAL RESEARCH

Orsay, France

Nov. 2022 - Present

- Compositional characterisation of (101955) *Bennu* and (162173) *Ryugu* using remote and laboratory spectral data with a focus on carbonates
- Description of space weathering of carbonaceous material through irradiation experiments and application to Main Belt asteroids

Observatoire de la Côte d'Azur

PHD RESEARCH

Nice, France

Oct. 2019 - Sept. 2022

- Revision of asteroid taxonomy using visible-near-infrared spectroscopy and albedo Mahlke et al. 2022
- Unsupervised machine learning approach allows for probabilistic classification of complete and partial observations
- Exploring connections between asteroids and meteorite via spectroscopy Eschrig, Mahlke et al. 2022
- Compilation of asteroid phase curve coefficients from ATLAS observations using Bayesian statistics Mahlke et al. 2021

J-PLUS Collaboration

MEMBER OF THE SOLAR SYSTEM SCIENCE GROUP

2020 - Present

- Responsible for detection of minor bodies in images of J-PLUS DR1 Mahlke et al. 2019
- Calibration of magnitudes for ultraviolet-visible spectrophotometry catalogue Morate, Mahlke et al. 2021

J-VAR Collaboration

RESPONSIBLE FOR DETECTION OF MINOR BODIES IN IMAGES

2019 - Present

- Collaboration executes observations at Observatorio Astrofísico de Javalambre for a wide range of transient sources
- Implemented fully-automatic pipeline to detect and recover minor bodies in all acquired images

Centro de Astrobiología, CSIC-INTA

PRE-PHD RESEARCH CONTRACT

Madrid, Spain

2018 - 2019

- Detection of near-Earth asteroid and Mars-Crosser observations in the ESA Hubble Science Archive Racero, Mahlke et al. 2021 · 📄
- Launch of Zooniverse project *Hubble Asteroid Hunters* to recover minor bodies with citizen-scientists Kruk, Mahlke et al. 2022
- Development of instrument-agnostic asteroid detection pipeline for astronomical images Mahlke et al. 2019
- Search for minor bodies in images of Gran Telescopio Canarias and UKIRT WFCAM Transit Survey Cortés-Contreras, Mahlke et al. 2019, 2020

RWTH Aachen University

MASTER RESEARCH

Aachen, Germany

2016 - 2017

- Analysis of time-series data of Active Galactic Nuclei to investigate periodic variability 📄
- Simulation of red-noise processes to assess the significance of periodicity in AGN using Bayesian statistics

ESAC, European Space Agency

TRAINEE PROGRAMME

Madrid, Spain

Feb. - Aug. 2016

- Development of a method to detect minor bodies in wide-field imaging surveys using a pipeline of SExtractor, SCAMP, and PYTHON data analysis
- Successful application of pipeline to the ESO/VST Kilo-Degree Survey DR-3 Mahlke et al. 2018

- Research in the context of medical physics and magnetic particle imaging
- Development of novel coil set-up for signal read-out in imager with application to test-system

Schulz, Mahlke et al. 2015

Skills

Minor Bodies Composition and Taxonomy · Spectroscopy · Phase Curves · Detection in Telescope Exposures

Languages German *Native* · English *Fluent in Written and Spoken* · Spanish *Advanced* · French *Intermediate*

Data Analysis SExtractor · SCAMP · SWARP · TOPCAT

Programming Python · Bash · Lua · SQL · \LaTeX · Unix

Open Science

I enjoy participating in open-source software development. These are some of the tools I develop for the minor-bodies community.

classy

A COMMAND-LINE CLIENT AND PYTHON PACKAGE FOR TAXONOMIC CLASSIFICATION OF ASTEROID OBSERVATIONS.

Since 2020

Published in Mahlke et al. 2022, A&A, 665

rocks

A COMMAND-LINE CLIENT AND PYTHON PACKAGE FOR THE SSODNET SERVICE OF THE IMCCE, PARIS.

Since 2019

To be published in Berthier, Carry, Mahlke and Normand 2022, under revision in A&A













ssos

A PIPELINE TO IDENTIFY MINOR BODIES IN TELESCOPE IMAGES BUILT ON TOP OF SExtractor AND SCAMP.

Since 2016

Published in Mahlke et al. 2019, A&A, 610

Publications

- 2023 **Mahlke** et al. *Spectral analogues of Barbarian asteroids among CO and CV chondrites*, submitted to A&A 
- 2022 Berthier, Carry, **Mahlke**, Normand *SsODNet: The Solar system Open Database Network*, accepted for publication in A&A 
- 2022 **Mahlke**, Carry, Mattei *Asteroid Taxonomy from Cluster Analysis of Spectrometry and Albedo*, A&A, 665 A&A Highlight in August 2022 
- 2022 Eschrig, ..., **Mahlke** et al. *Investigating S-type asteroid surfaces through reflectance spectra of Ordinary Chondrites*, Icarus, 381 
- 2022 Kruk, ..., **Mahlke** et al. *Hubble Asteroid Hunter: I. Identifying asteroid trails in Hubble Space Telescope images*, A&A, 661 
- 2021 **Mahlke**, Carry, Denneau *Asteroid phase curves from ATLAS dual-band photometry*, Icarus, 354 
- 2021 Morate, ..., **Mahlke** et al. *J-PLUS: A first glimpse at the spectrophotometry of asteroids. The MOOJa catalog*, A&A, 655 
- 2021 Racero, ..., **Mahlke** et al. *ESASky SSOSS: Solar System Object Search Service and the case of Psyche*, A&A, 659 
- 2020 Cortés-Contreras, ..., **Mahlke** et al. *The Gran Telescopio Canarias OSIRIS broad-band first data release*, MNRAS, 491 
- 2019 Cortés-Contreras, ..., **Mahlke** et al. *Identification of asteroids using the Virtual Observatory: the WFCAM Transit Survey*, MNRAS, 490 
- 2019 **Mahlke** et al. *The ssos pipeline: Identification of Solar System objects in astronomical images*, A&C, 28 
- 2018 **Mahlke** et al. *Mining the Kilo-Degree Survey for solar system objects*, A&A, 610 
- 2015 Schulz, ..., **Mahlke** et al. *A Field Cancellation Signal Extraction Method for Magnetic Particle Imaging*, IEEE, 51 