

# Andrea Gebek

PHD STUDENT · ASTROPHYSICS

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## Education

### Faculty of Sciences, Universiteit Gent

DOCTOR OF SCIENCE: ASTRONOMY

Ghent, Belgium

Sep. 2020 - Exp. Sep. 2024

- PhD Thesis: Atomic Gas in Galaxies: A Critical Test for State-of-the-Art Cosmological Simulations of Galaxy Formation
- Advisors: Maarten Baes and Erwin de Blok

### Departement Physik, Eidgenössische Technische Hochschule Zürich

MASTER OF SCIENCE ETH IN PHYSICS

Zurich, Switzerland

Sep. 2018 - Aug. 2020

- Master Thesis: Alpha-Enhancement in the EAGLE Simulation
- Advisors: Jorryt Matthee and Simon Lilly

### Philosophisch-naturwissenschaftliche Fakultät, Universität Bern

BACHELOR OF SCIENCE IN PHYSICS WITH SPECIAL QUALIFICATION IN ASTRONOMY

Bern, Switzerland

Sep. 2015 - Sep. 2018

- Bachelor thesis: Evolution of Escaping Exoplanet Atmospheres in Space and Time
- Advisors: Apurva V. Oza and Christoph Mordasini

### Gymnasium Interlaken

EIDGENÖSSISCHE MATURITÄT

Interlaken, Switzerland

Aug. 2011 - Jul. 2015

## Publications

### Sodium and Potassium Signatures of Volcanic Satellites Orbiting Close-in Gas Giant Exoplanets

ApJ, Accepted

APURVA. V. OZA ET AL. INCLUDING ANDREA GEBEK

Sep. 2019

- Simulated transit spectra of Exoplanets in the sodium D doublet.
- Showed that for the hot Jupiter WASP-49b an outgassing exomoon reproduces the observed transit spectrum significantly better than a conventional hydrostatic atmosphere.

### Alkaline Exospheres of Exoplanet Systems: Evaporative Transmission Spectra

MNRAS, Accepted

ANDREA GEBEK AND APURVA V. OZA

Jul. 2020

- Developed a Python code which simulates transit spectra in the sodium/potassium D doublets for a variety of physical scenarios of hot Jupiter atmospheres (hydrostatic/escaping/exomoon/torus).
- Showed that different scenarios can be fitted to the same observations.
- Presented tentative indicators to detect exogenic sources in transit spectra of hot Jupiters.

### On the Variation in Stellar Alpha-Enhancements in star-forming galaxies in the EAGLE Simulation

In Preparation

ANDREA GEBEK AND JORRYT MATTHEE

Exp. Mar. 2021

- Defined two ways of calculating stellar alpha-enhancement and applied them to the cosmological EAGLE simulation.
- Found that the two definitions are not correlated for star-forming galaxies as they depend in different ways on the galactic star-formation history.
- Tentatively found that these different alpha-enhancements are measurable in nearby star-forming galaxies.

## Research Experience

### CONFERENCES

#### EPSC-DPS Joint Meeting 2019

Geneva, Switzerland

NONHYDROSTATIC DENSITY PROFILES OF SODIUM AND POTASSIUM AT CLOSE-IN GAS GIANT EXOPLANETS

Sep. 2019

- Participated at the joint meeting of the European Planetary Science Congress and the Division for Planetary Sciences (U.S.) and presented our exoplanet research.

#### First Interdisciplinary Student's Conference of Switzerland

Zurich, Switzerland

EXOPLANETARY ATMOSPHERES: SEARCHING FOR SIGNS OF SODIUM, MOONS AND LIFE

Apr. 2019

- Presented our research to an interdisciplinary audience.

## OBSERVATIONAL PROGRAMS

### Exogenic Metals at Two Close-in Gas Giant Systems

KECK/HIRES

SCIENTIFIC CO-INVESTIGATOR

2019-2020

- Awarded observation time to search for signatures of exogenic sources (like an exomoon) around the hot Jupiters HD 209458b and WASP-49b.

## Extracurricular Activity

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### Private Tutoring

Switzerland

PART-TIME JOB

2012 - 2020

- Taught mathematics, physics and chemistry for high-school and undergraduate students (several hours per week).
- I accompanied over forty students in these eight years.

### Summer Academy "Philosophical reflections on an AI future"

Migliaglia, Switzerland

PARTICIPATED AS MEMBER OF THE SWISS STUDY FOUNDATION

Jul. 2019

- Discussed one week with twenty other students from the Swiss Study Foundation about the ethical implications, chances and risks of an AI future.

### Representation Physics Teacher

Interlaken, Switzerland

GYMNASIUM INTERLAKEN

Jan. 2019

- Taught a high-school class in mathematics and physics.

### Workshop "Communication in science"

Luzern, Switzerland

PARTICIPATED AS MEMBER OF THE SWISS STUDY FOUNDATION

Jun. 2018

- Learned with specialists from print media and TV how to explain one's research to a layman audience in an accessible way.
- Trained with recording equipment how to give interviews and statements.

### Swiss Study Foundation

Switzerland

MEMBER

Sep. 2016 - Sep. 2020

- Got accepted to the Swiss Study Foundation in September 2016. The Swiss Study Foundation strives to connect excellent students across all disciplines and to broaden their horizons with interdisciplinary workshops and summer academies.

## Skills

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**Languages** German (native), English (fluent), French (basic)

**Programming** Python, C++, Fortran, LaTeX

## Awards

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2015 **Honorable Mention**, 46th International Physics Olympiad

Mumbai, India

2015 **4th Place**, Swiss Physics Olympiad

Aarau, Switzerland