Exo-Atmospheres Summer School II (EASS II)

22-26 June 2020

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UNIVERSITÄT
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CSH
CENTER FOR SPACE AND
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I. Background, History & Motivation

The Exo-Atmospheres Summer School (EASS) is a week-long immersion in the theory and simulation of the atmospheres of exoplanets. It consists of four events combined into one: introductory lectures, a conference, a beginner's hackathon and an expert's hackathon.

The introductory lectures will cover the basics of exoplanetary atmospheres as a one-day "crash course": radiative transfer, chemistry, fluid dynamics. The two-day conference is focused on speakers who are practitioners in the theory and simulation of exoplanetary atmospheres. In particular, we will prioritise giving talk time to junior researchers who actively work on research problems in this field.

The beginner's hackathon introduces students and postdocs to the open-source codes of the Exoclimes Simulation Platform (ESP; https://github.com/exoclimes). The expert's hackathon is a forum for experts in the field to compare and discuss different computational tools. For 2020, we have invited Prof. Ray Pierrehumbert (Oxford) and Prof. Nathan Mayne (Exeter) for the expert's hackathon.

II. Venue & Deadlines

The EASS will be hosted in the city of Bern, Switzerland. The introductory chalkboard lectures (first day), beginner's hackathon (fourth day) and expert's hackathon (fifth day) will be held on the campus of the University of Bern. The two-day conference (second and third days) will be held at the top of a local hill named the Gurten (www.gurtenpark.ch); the conference venue is named the Gurten Pavillon (https://www.gurtenpark.ch/de-CH/Service-Pages/Pavillon).

The registration fee of **500 Swiss francs (CHF)** includes three lunches and several coffee/tea breaks.

First announcement: 7th February 2020 (Friday)
Application Deadline: 30th April 2020 (Thursday)
Registration Fee Payment Deadline: 29th May 2020 (Friday)
Last Chance to Withdraw from Summer School: 12th June 2020 (Friday)

III. Summer School Schedule

Time	Session	Remarks
22nd June 2020 (Monday): Basics of Exoplanetary Atmospheres Venue: Exact Sciences building (Sidlerstrasse 5, CH-3012, Bern), Room #119		
09.00-10.00	Arrival coffee/tea	Meet-and-greet, networking
10.00-10.45	Introduction to radiative transfer	Lecturer: Kevin Heng
11.00-11.45	Introduction to opacities	Lecturer: Kevin Heng
12.00-14.00	**Lunch** (Provided at Grosse Schanze)	
14.00-14.45	Introduction to atmospheric chemistry	Lecturer: Kevin Heng
15.00-15.45	The Big Picture: Bringing It Altogether	Lecturer: Kevin Heng
16.00-17.00	Discussion	Involves all attendees
23rd June 2020 (Tuesday): Exoplanetary Atmospheres Conference Venue: Gurten Pavillon		
08.00-09.00	Morning coffee/tea	Meet-and-greet, networking
09.00-10.30	Talks	Speakers TBD
10.30-11.00	**Coffee/tea break**	
11.00-12.30	Talks	Speakers TBD
12.30-14.00	**Lunch** (On Your Own at Gurten's Tapis Rouge)	
14.00-15.30	Talks	Speakers TBD
15.30-16.00	**Coffee/tea break**	
16.00-17.30	Talks	Speakers TBD
24th June 2020 (Wednesday): Exoplanetary Atmospheres Conference Venue: Gurten Pavillon		
08.00-09.00	Morning coffee/tea	Meet-and-greet, networking
09.00-10.30	Talks	Speakers TBD
10.30-11.00	**Coffee/tea break**	
11.00-12.30	Talks	Speakers TBD
12.30-14.00	**Lunch** (On Your Own at Gurten's Tapis Rouge)	
14.00-15.30	Talks	Speakers TBD
15.30-16.00	**Coffee/tea break**	
16.00-17.30	Talks	Speakers TBD

Time	Session	Remarks
25th June 2020 (Thursday): Beginner's Hackathon Venue: University of Bern main building (Hochschulstrasse 6, CH-3012, Bern), Kuppelraum (top floor)		
09.00-09.30	Introduction to HELIOS	Lecturer: Matej Malik
09.30-10.00	Introduction to HELIOS-K	Lecturer: Simon Grimm
10.00-10.30	Introduction to HELIOS-R2	Lecturer: Daniel Kitzmann
10.30-11.00	**Coffee/tea break**	
11.00-11.30	Introduction to FastChem	Lecturer: Daniel Kitzmann
11.30-12.00	Introduction to VULCAN	Lecturer: Shang-Min Tsai
12.00-12.30	Introduction to THOR	Lecturer: Russell Deitrick
12.30-14.00	**Lunch** (Provided at Kuppelraum foyer)	
14.00-15.30	Beginner's Hackathon	Interaction with code developers
15.30-16.00	**Coffee/tea break**	
16.00-17.30	Beginner's Hackathon	Interaction with code developers
26th June 2020 (Friday): Expert's Hackathon Venue: University of Bern main building (Hochschulstrasse 6, CH-3012, Bern), Kuppelraum (top floor)		
09.00-12.00	Format TBD	Experienced code users
10.00-10.30	**Coffee/tea break**	
10.30-12.00	Format TBD	Experienced code users
12.00-14.00	**Lunch** (Provided at Kuppelraum foyer)	
14.00-17.00	Format TBD	Experienced code users
15.30-16.00	**Coffee/tea break**	
16.00-17.30	Format TBD	Experienced code users
End of Exo-Atmospheres Summer School 2020		

IV. Application & Registration Fee

The EASS is primarily aimed at students and postdocs who are interested in the theory and simulation of exoplanetary atmospheres. To apply, please send a **one-page letter (use a maximum of two pages only if you must)** with the following information:

1. Indicate your email address somewhere in the letter.
2. Describe your path of education so far: degrees earned and universities/institutions attended.
3. List your Ph.D and/or postdoc advisors.
4. Describe your research interests briefly.
5. Describe very briefly why you are interested in the summer school.

6. If you are interested in giving a talk, please provide a title and brief abstract.

This letter should be in **PDF format** and sent to **Kevin Heng** (kevin.heng@csh.unibe.ch**) by 30th April 2020**. Early applications are allowed and encouraged. **You will be invited by Danielle Zemp (**danielle.zemp@csh.unibe.ch**) to pay the registration fee of 500 Swiss francs (CHF).**

V. Travel & Logistics

Participants will fly into the Zurich (ZRH), Basel (BSL) or Geneva (GVA) airports (listed in increasing order of travel time by train to Bern) and take the local Swiss trains to Bern. Please use **www.sbb.ch** to plan your train travel.

The University of Bern is located directly above the main station in Bern. When you alight from the train, take one of the stairs or tunnels underground and search for a set of elevators. Take the elevator to the top floor and you will arrive on the campus of the University of Bern. The CSH and Exact Sciences building are both within a few minutes' walk from the elevator.

To reach the Gurten Pavillon, please take Tram #9 to the "Gurtenbahn" stop. Alight and walk uphill for 5-10 minutes. Take the mini-mountain train (~5 minutes) to the top of the Gurten. The Pavillon is located right next to the final stop. (If you are staying in a hotel in Bern, you should be provided with a local transportation card that should allow you to take both the tram and mini-mountain train for free.)

VI. Participants of the Conference (so far)
- Note: some of the participants were explicitly solicited as they are either active code developers or users. Generally, we anticipate constructing a participant pool that is heavy on junior researchers and code developers/users, but we also warmly welcome complete beginners who are curious.

Dr. Russell Deitrick (CSH, University of Bern): ultra-hot Jupiter GCMs
Chloe Fisher (University of Bern): co-developer of HELA machine learning retrieval code
Andrea Guzman Mesa (University of Bern): HELIOS, HELIOS-K and HELA codes super-user
Dr. Jens Hoeijmakers (University of Bern / Geneva Observatory): high-resolution spectroscopy
Dr. Daniel Kitzmann (University of Bern): atmospheric retrieval of brown dwarfs using HELIOS-R2
Dr. Graham Lee (University of Oxford): cloudy GCMs and 3D radiative transfer
Sinan Li (University of Bern): ultra-hot Jupiter GCMs
Dr. Matej Malik (University of Maryland): radiative transfer using the HELIOS code
Prof. Dr. Nathan Mayne (University of Exeter): general circulation models using the UM code
Dr. Joao Mendonca (Danish Technical University): general circulation models using the THOR code
Prof. Dr. Ray Pierrehumbert (University of Oxford): general theory and simulation
Dr. Shang-Min "Shami" Tsai (University of Oxford): photochemical kinetics using the VULCAN code
Mantas Zilinskas (Leiden Observatory): applications of VULCAN

VII. Expertise of Lecturers (Beginner's Hackathon)
- Note: the beginner's hackathon is exclusively geared towards introducing beginners to codes and therefore features only the code developers as lecturers.

Dr. Russell Deitrick (CSH, University of Bern): co-developer of THOR general circulation model

Dr. Simon Grimm (CSH, University of Bern): developer of HELIOS-K opacity calculator

Prof. Dr. Kevin Heng (CSH, University of Bern): general theory

Dr. Daniel Kitzmann (CSH, University of Bern): developer of FastChem code (equilibrium chemistry) and HELIOS-R2 code (atmospheric retrieval using nested sampling)

Dr. Matej Malik (University of Maryland): developer of HELIOS radiative transfer code

Dr. Shang-Min "Shami" Tsai (University of Oxford): developer of VULCAN chemical kinetics code

VIII. Ground Rules

The EASS is a professional setting. We expect the participants to conduct themselves in a professional, civil, responsible and punctual manner. We expect the participants to exercise intellectual empathy when interacting with the other participants.

Before attending the EASS, you should ensure that you have a functioning laptop that is able to run Linux and Python. We will provide remote login access to our dedicated computer servers at the University of Bern to provide access to GPUs.

You will bring this functioning laptop along with you to the EASS. We will not be responsible for providing any power adaptors or computing equipment.