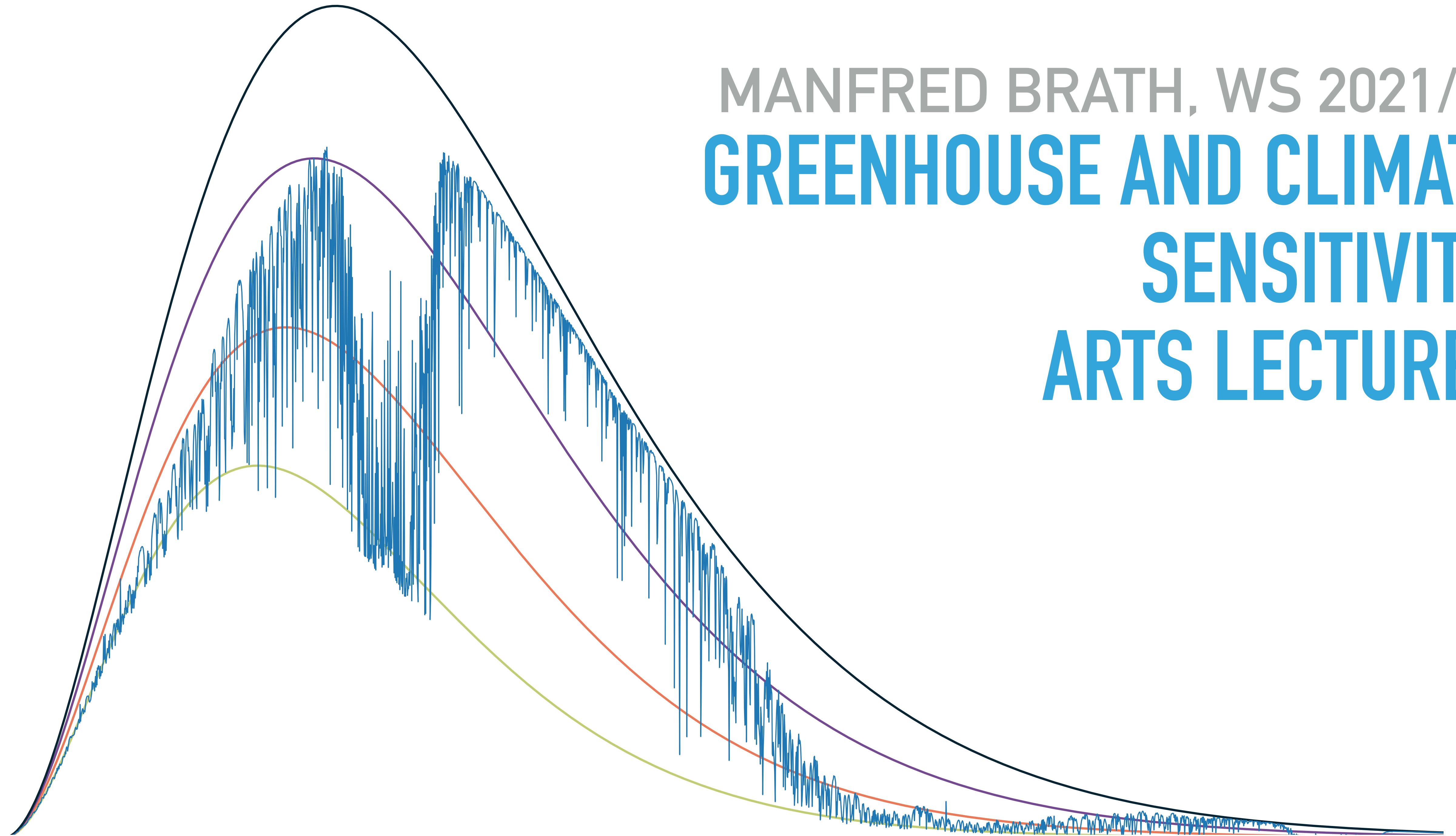


MANFRED BRATH, WS 2021/22
**GREENHOUSE AND CLIMATE
SENSITIVITY:
ARTS LECTURES**



WHAT IS ARTS?

ATMOSPHERIC RADIATIVE TRANSFER SIMULATOR (ARTS)

- ▶ Radiative transfer model for microwave to thermal IR (even fully polarised)
- ▶ Developed by the radiation and remote sensing group of the Meteorological Institute of Universität Hamburg and Chalmers University in Gothenburg

ARTS KEY FEATURES

- ▶ Radiative transfer model for microwave to thermal IR (even fully polarised)
- ▶ Spherical geometry (1D, 2D, or 3D)
- ▶ State of the art absorption models: **line-by-line** calculations based on HITRAN or other catalogs plus various continua
- ▶ All viewing geometries: up, limb, nadir, from inside or outside the atmosphere
- ▶ 4 different scattering solvers
- ▶ Dedicated methods for heating rate calculations and retrievals (1d-Var, OEM)
- ▶ Fully controllable from Python (PyARTS)
- ▶ Implemented in C++, modular design

ARTS DOCUMENTATION

- ▶ ARTS user guide

https://atmtools.github.io/arts-docs-master/uguide/arts_user.pdf

- ▶ ARTS theory guide

https://atmtools.github.io/arts-docs-master/uguide/arts_theory.pdf

- ▶ ARTS docserver

<https://atmtools.github.io/arts-docs-master/docserver/index.html>

- ▶ PyARTS

<https://atmtools.github.io/arts-docs-master/pyarts/index.html>

ARTS GENERAL INFORMATIONS

- ▶ For more information about ARTS see:

<https://www.radiativetransfer.org>

or

<https://github.com/atmtools/arts>

ARTS LECTURES

ARTS LECTURES

- ▶ Consists of 8 to 9 Jupyter notebooks with different aspects of ARTS.
- ▶ For this course, two exercises considering
 - ▶ absorption cross section,
 - ▶ absorption coefficient and
 - ▶ line shape

ARTS LECTURES

- ▶ For those, who wants to dig even more into ARTS and radiation, there is the

Advanced radiation and remote sensing course

Tue 14h30 and Thu 12h00 room 1536c

GETTING ARTS LECTURES

▶ Open terminal and login onto mistral via ssh and type:

1) `curl -OL https://attachment.rrz.uni-hamburg.de/97c802f4/artscourse.zip`

2) `unzip artscourse.zip`

3) `cd artscourse`

4) `./setup-mistral.sh`

JUPYTERHUB

- 1) Log in to jupyterhub.dkrz.de
- 2) Start a preset profile
- 3) Navigate to
`artscourse/arts-lectures/exercises/01-molecule_spectra` **or**
`artscourse/arts-lectures/exercises/02-line_shape`
- 4) Open the file with the `".ipynb"` ending
- 5) Set `"ARTS_DATA_PATH"` to `"~/artscourse/"`
- 6) Enjoy!