

# Statistical methods in X-ray astronomy



Argelander-  
Institut  
für  
Astronomie

BCGS intensive course  
December 17-21, 2018



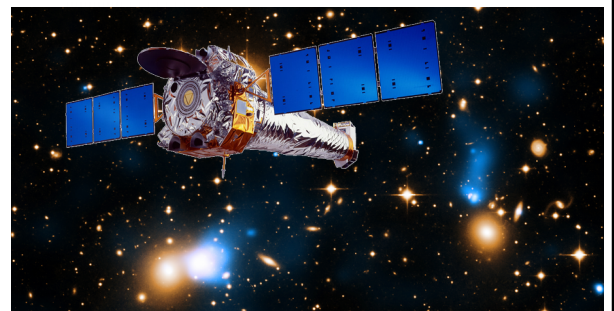
**This course will focus on the statistical methods that can be applied to observational data of galaxy clusters in X-rays.**

Starting with a general introduction of the physical processes, detectors and data products in X-ray astronomy I will go beyond what can be covered with the lecture “X-ray astronomy” by Prof. Reiprich. In a second part students are encouraged to practically work on data and apply the learned methodology, to analyze a galaxy cluster observed by Chandra X-ray satellite.

**Lecturer: Dr. Gerrit Schellenberger**

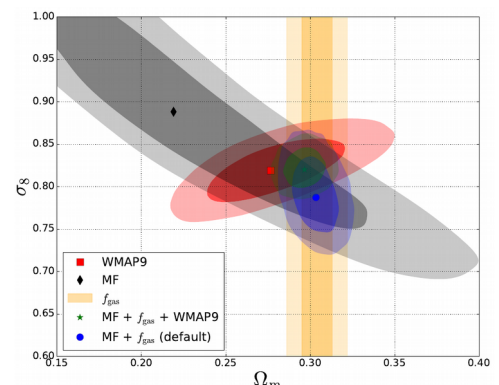


SAO Fellow at  
Harvard-Smithsonian  
Center for Astrophysics

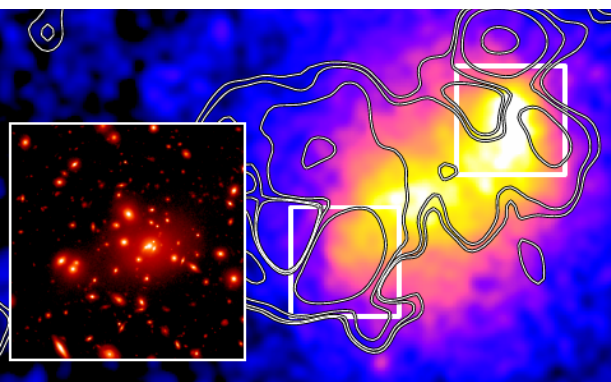


## Topics:

- Overview of X-ray missions, advantages of the different detector types, biases from instrumental calibration
- Galaxy clusters in X-rays (emission models) and connection to cosmology
- Gaussian and Poisson statistics for model fitting, Bayesian approaches
- Introduction into python tools to be used by students during hands-on session
- Practical X-ray data reduction: Structure and important steps to “clean” data
- Obtain temperature and surface brightness profiles and fitting models to them. When is a model a good model?
- Background modeling vs. subtracting
- Write an MCMC code in python to fit X-ray spectra and profiles. How do biases affect the results (intermediate temperatures and cosmological results)?



**Open to Master/PhD students with basic knowledge in python**



Lectures **Dec 17: 8 – 11am (Lecture hall)**  
**Dec 18: 8 – 11am (Room 3.010)**  
**Dec 19: 8 – 11am (Lecture hall)**  
Practical **Dec 20 & 21 TBD (CIP-Pool)**

To sign up for this course please send an email to  
[gerrit.schellenberger@cfa.harvard.edu](mailto:gerrit.schellenberger@cfa.harvard.edu)

Deadline: December 7

Max. number of participants: 20