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)
Dec 20 & 21 TBD (CIP-Pool)

Practical

To sign up for this course please send an email to gerrit.schellenberger@cfa.harvard.edu
Deadline: December 7
Max. number of participants: 20