



Contribution ID: 12

Type: **Standard Talk**

The Athena X-IFU instrument simulator *xifusim*

Tuesday 15 June 2021 13:50 (25 minutes)

We present the instrument simulator *xifusim* developed for the X-ray Integral Field Unit (X-IFU), an X-ray microcalorimeter aboard the planned ESA mission *Athena*. The goal of the X-IFU is to perform spatially resolved spectroscopy from 0.2 to 12 keV over a field of view of 5' equivalent diameter, with a spectral resolution of 2.5 eV up to 7 keV on 5" pixels.

The main purpose of *xifusim* is to be a performance study tool to reach these goals and to provide input for higher level simulators such as the SIXTE simulation toolkit. As such, it aims to be an accurate representation of the entire instrument, starting from a full numerical simulation of the Transition-Edge Sensor array receiving impact photons. Its output signal is then propagated through the entire readout chain, including multiplexing, amplification and digital readout. The final output consists of triggered records, which can be post-processed to reconstruct the photon energies.

In the code, the readout chain itself is separated into individual, modular blocks with several possible models for each, allowing the simulation of different readout schemes or models of varying physical accuracy at the expense of runtime. New models are implemented as necessary to enable studies of the overall readout chain. Such studies are also facilitated by fine-grained control of the simulation output, including the internal state of intermediate simulation blocks. Additional interfaces to manipulate certain internal parameters during a run also allow the simulation of readout chain characterization measurements, environmental drifts and certain kinds of crosstalk.

Authors: KIRSCH, Christian (FAU Erlangen-Nürnberg); Mr LORENZ, Maximilian (Remeis Observatory & ECAP); Dr PEILLE, Philippe (Centre national d'études spatiales); Dr DAUSER, Thomas (Remeis Observatory & ECAP); Mr KÖNIG, Ole (Remeis Observatory & ECAP); Dr CEBALLOS, Maite (Instituto de Física de Cantabria); Dr COBO, Beatriz (Instituto de Física de Cantabria); Prof. WILMS, Jörn (Remeis Observatory & ECAP)

Presenter: KIRSCH, Christian (FAU Erlangen-Nürnberg)

Session Classification: X-ray Instrument Simulators

Track Classification: Talks