## Detector Modelling Workshop 2021 (DeMo)



Contribution ID: 21

Type: Standard Talk

## SIXTE: a generic X-ray instrument simulation toolkit

Tuesday 15 June 2021 13:25 (25 minutes)

We present the SImulation of X-ray TElescopes (SIXTE) software package, a generic, mission-independent Monte Carlo simulation toolkit for X-ray astronomical instrumentation. The package is based on a modular approach for the source definition, the description of the optics, and the detector type such that new missions can be easily implemented. The targets to be simulated are stored in a flexible input format called SIMPUT. Based on this source definition, a sample of photons is produced and then propagated through the optics. In order to model the detection process, the software toolkit contains modules for various detector types, ranging from proportional counter and Si-based detectors, to more complex descriptions like TES devices. The implementation of characteristic detector effects and a detailed modeling of the read-out process allow for representative simulations and therefore enable the analysis of characteristic features, such as for example pile-up, and their impact on observations. Dedicated and detailed instrument simulators like "xifusim" are used to create specific input data to allow for very detailed instrument simulations, while at the same time being fast enough to simulate long observations without requiring extensive computing resources. In order to demonstrate the capabilities of the simulation software, we present a selection of representative applications, including the all-sky survey of eROSITA, a study of pile-up effects comparing the currently operating XMM-Newton with the planned Athena-WFI instrument, and a galaxy cluster simulation with the micro-calorimeter Athena X-IFU.

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Session Classification: X-ray Instrument Simulators

Track Classification: Talks