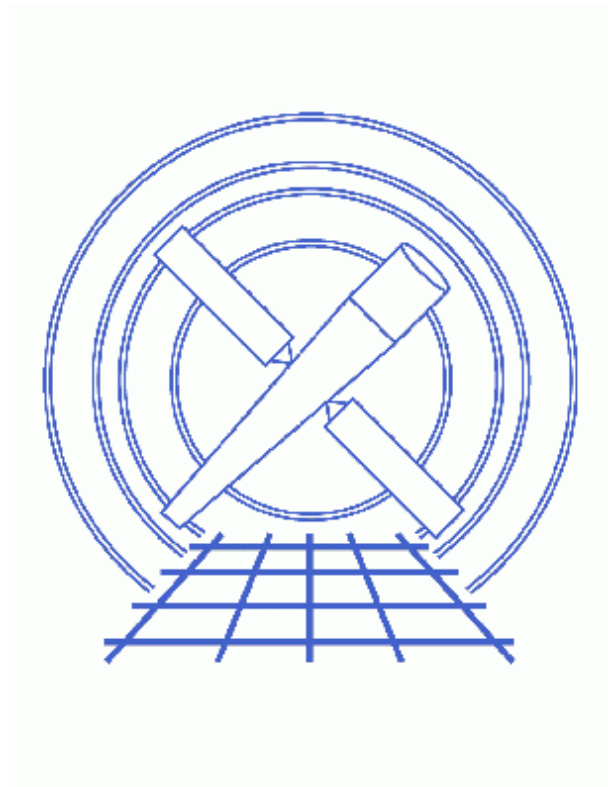


# Scripts for HETG and LETG Proposal Simulations



## Proposal Threads for Cycle 11

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# Scripts for HETG and LETG Proposal Simulations

## Proposal Threads for Cycle 11

### Grating Simulations

This page has links to two scripts which can be used to simulate high resolution LETG and HETG spectra. They are written in the **Interactive Spectral Interpretation System (ISIS)** and are intended for proposers with some experience with X-ray spectroscopy. They can be used "as is" or edited to accommodate your own proposal requirements. Each script contains extensive comments explaining each step.

If you have previously used "FAKEIT" in XSPEC or Sherpa and have a basic understanding of the files used for X-ray spectroscopy (e.g. PHA, ARF, RMF) you should be able to follow these scripts. The [FAKEIT](#) thread gives a simple example of how to simulate a (non-grating) ACIS spectrum. The [XSPEC Users manual](#) also shows how to simulate X-ray spectra. The CXC spectral fitting package Sherpa can also be used to simulate Chandra spectra (using [SLANG](#) or [Python](#) versions).

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### Modeling and Assessment of Higher Spectral Orders in LETG/HRC-S Spectra.

**Download script package [letgs\\_orders-script.tgz](#). The package contains the script, input parameter files and output plots.**

This thread uses observations made with the Low Energy Transmission Grating Spectrometer (LETGS) to show how to assess and model higher spectral order contributions. We do this for two cases, Markarian 421, a strong continuum source, and Capella, an emission-line dominated source. We also show how to manipulate the background contribution.

After working with the observed data, we then adjust model parameters to create a simulated dataset for a fainter source such as may be done for proposal planning purposes. We fit models to the fake data to determine parameter values and confidence limits which may be of interest for scientific justification. We also derive some values which are useful for feasibility and for entry on the proposal target summary forms.

The HRC-S detector does not have enough resolution to sort spectral orders, and it has a relatively high instrumental background rate. Both of these traits are particular to LETGS and can complicate analysis.

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# Simulate the High Energy Transmission Grating Spectrum of a Coronally Active Star and Measure Line Fluxes and Ratios

Download script package [sim\\_ne9\\_hetgs](#). The package contains the script, input parameter files and output plots.

This thread simulates an observation with the High Energy Transmission Grating Spectrometer (HETGS) of a stellar coronal plasma, then measures lines in the region of the astrophysically interesting Ne IX triplet at 13 Å. The simulations are based on the Chandra/HETGS observations of the coronally active binary system, UX Ari (obsid 605). The Ne IX triplet lines are density sensitive in a regime important for coronal plasmas, with a critical density of  $\log(n_e) \sim 11$ .

The thread shows how to determine single-parameter confidence limits in the flux and also computes count-rates and signal-to-noise ratios for the features. The density sensitive ratio of the forbidden to intercombination line fluxes is evaluated, along with its uncertainty.

Emission lines are important in many astrophysical sources. This thread can be easily modified to apply to other point-source spectral regions, different integrated source fluxes, and different exposures in regimes where the instrumental or cosmic background are not important (which is generally the case for HETGS, since order-sorting strongly suppresses background; the source's continuum is much more important).

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## History

01 Feb 2009 Initial Version

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URL: [http://cxc.harvard.edu/pog/threads/grating\\_scripts/](http://cxc.harvard.edu/pog/threads/grating_scripts/)

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