

Profit: A spectral analysis GUI

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Spectral Analysis Needs

Users with high-resolution spectra (with $\sim 10^4$ bins) would like a new analysis tool in addition to XSPEC (or Sherpa).

This tool must:

- Understand standard X-ray spectra data formats
- Have easy-to-use interface
- Link to existing atomic databases
- Connect to existing spectral tools (XSPEC, Sherpa)
- Be freely distributable

Plus, of course, it must do some useful analysis tasks!

Existing Similar Tools

- **PintOfAle**: Useful tool, but requires IDL and focused on stellar coronae issues
- **ISIS**: Requires S-lang competency to use efficiently.
- **vWhere**: Good framework, but focused on event data, rather than spectral analysis.

Genesis of Profit

Randall: Visualized GUI tool that would allow easy plot selections, line identification and fitting and would link to the ATOMDB.

James: Currently developing GLAST software using the (free) ROOT toolkit, a robust set of libraries used extensively by the high-energy community and extremely well-supported.

Fortunately, the two met years ago and resumed having semi-regular lunches after Randall returned to Goddard...

Existing Features

- Displays fixed thumbnail & scrollable main plots
- Modifiable plot features (linestyle, color)
- Finds lines from ATOMDB that match plot
- Can convert energy spectral to velocity spectra
- Stores & restores subplots
- Fits spectral with simple Gaussian fits (via ROOT intrinsics)
- Internal ability to handle either wavelength or energy data

(Some) Future Plans

Fitting

- Do complex fitting through interface to XSPEC
- Generate XSPEC xcm file to load observed subplot immediately
- Display plot residuals

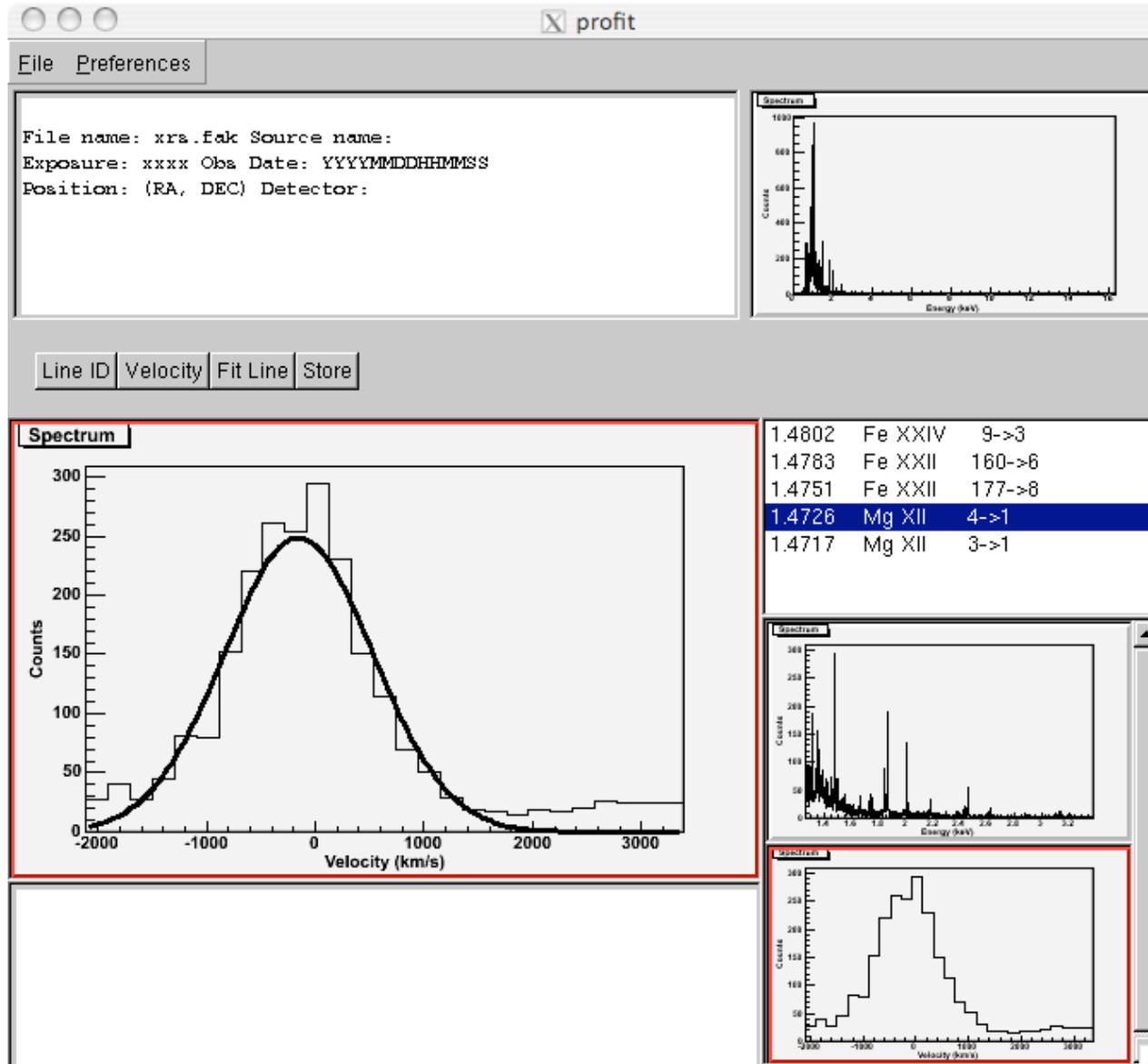
Line Identification

- User filters on line id list (ie, only Fe lines, only He-like, etc)
- Temperature -selected line id list, rather than peak emission
- Display implied lines (ie, Fe XVII 3C line implies a 3D line)
- Create latex table from line id, fluxes
- Support for absorption spectroscopy (sort by oscillator strength)

Plot Display

- Show/hide error bars; allow rebinning, smoothing, etc
- Using input redshift, show in observed or source frame
- Overlay (or co-add) individual line spectra in velocity space
- Display observed line ratio and temperature/density curve

And now a screenshot...



A sufficiently advanced technology is
indistinguishable from a rigged demo...

...paraphrasing Larry Niven