Fe Kα line in the **r**eflected spectrum of **i**onized accr**e**tion disk **N**' **d**usty toru**s** **(FRIENDS)**

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motivation

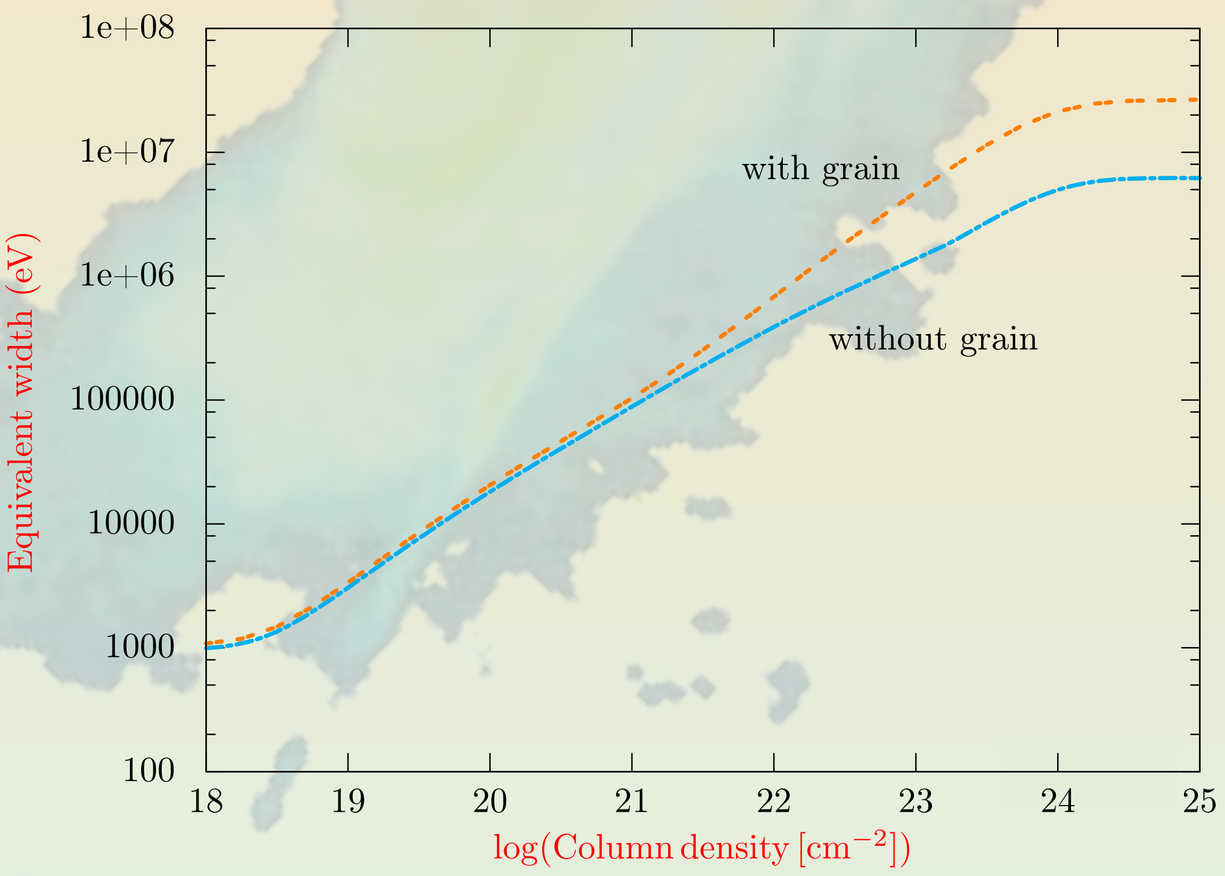
- Observationally, the main feature in the X-ray spectra of an AGN is a power-law continuum, which is presented as $N(E) \propto E^{-\Gamma}$.
- This power-law component is thought to be produced by the inverse Comptonization of optical/UV photons in a hot corona located close to the accretion disc (Haardt and Maraschi 1991).
- A significant fraction of X-ray radiation is scattered (reflected) by the material along the line of sight between the X-ray source and the observer (Turner and Miller 2009).
  - *The reflection component is produced through Compton scattering of X-ray photons into the line of sight by optically thick material.*
  - *It is the most significant in the* $5 - 50\,\mathrm{keV}$ *range with a peak at around* $30\,\mathrm{keV}$ *(Krolik 1999, the so-called Compton hump).*
- The 6.4 keV fluorescent Fe Kα line, which is expected if reflection is important (George, Fabian, and Nandra 1990), is the most prominent emission line in the X-ray spectra of AGN (Pounds et al. 1990; Nandra and Pounds 1994).

In this project, we examine how the property of the Fe Kα line changes with the column density, hydrogen density as well as dust in the torus.

Potential radiative heating requires more careful study using the *extra* options and the temperature solver in CLOUDY, which was not possible to perform given the time constraints of this project. A final goal could be to make a complete model of disk reflection using CLOUDY for the radiative processes.

Calculations are performed with version C16 (trunk, exported, experimental) of CLOUDY *(Ferland et al. 2013).*

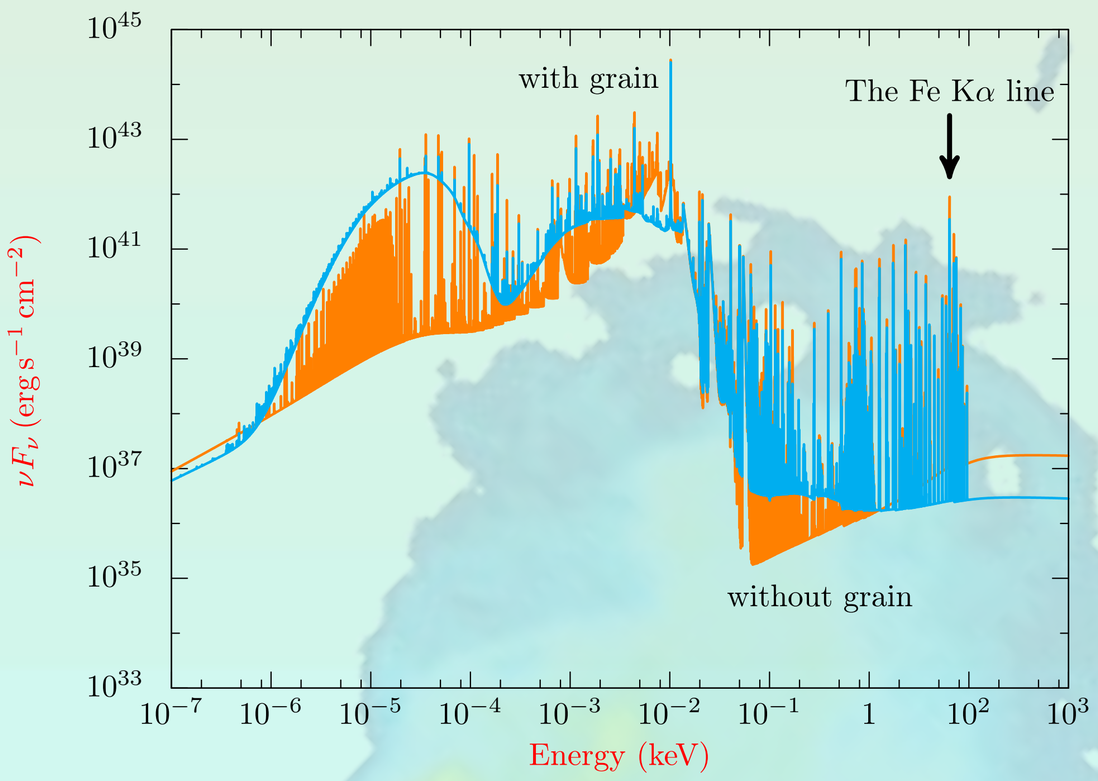
reflected spectra from AGN torus



The width of the Fe Kα line as observed from the torus at 10 pc away from the AGN. The grain abundance is taken as of ISM with 50% Fe depletion. The incident radiation field is modeled is a multi-component continuum, typical of AGN.

The temperature of the incident radiation field is 1.4×10^5 **K**

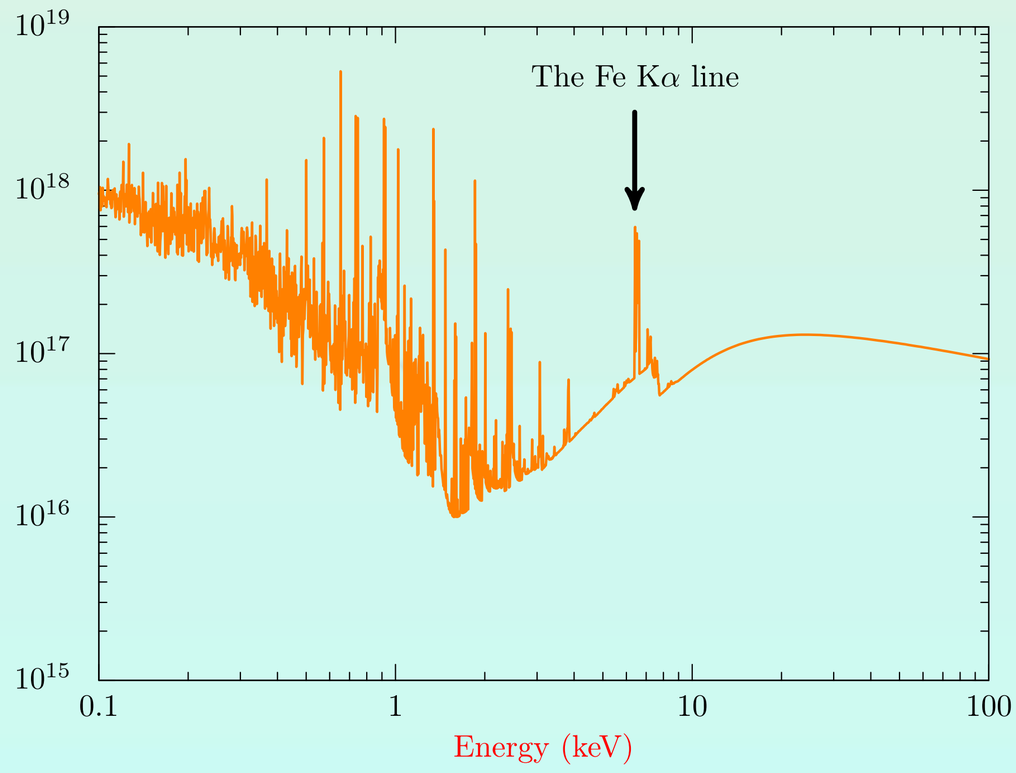
reflected spectra from disk



The reflected spectra from the torus, with and without grain. The grain abundance is that of ISM with a 50% Fe depletion.

The reflected spectra from the accretion disk. Different parameters of the simulation are :

hydrogen density $n_H = 10^{18}\,\mathrm{cm}^{-3}$**, ionization parameter** $\xi = 50\,\mathrm{erg\,cm\,s}^{-1}$**. We have also included viscous heating with** $H_{\mathrm{vis}} = 10^{10}\,\mathrm{erg\,cm}^{-3}\,\mathrm{s}^{-1}$ **is the volume-heating rate**



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