Effects of different selections of (atomic data and) plasma emission models

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Outline

Go This talk will be the **easiest** one in this session 😂

What I am going to show you is...

Simple comparisons of spectra with different atomic codes

- Example 1: Lines
- Example 2: Continuum



Examples are from collisional plasma cases only. Comparisons are for AtomDB & SPEX only.

Comparison 1: Lines

- Let's take Fe Kα as an example
 - But isn't it already calibrated well with the Hitomi data?



• It's true, but only partly true.











Comparison 1: Lines — Fe Kα centroid



- Simply compare thermal continuum emission for CIE
 - nlapec for AtomDB, cie with "ions ignore all" for SPEX
 - at solar abundance with the same ref. (Lodders+09)







Additional comment

 Inter-code agreement does not always guarantee that the codes are correct — an example from recombining plasma

3.7





Both codes under-predict high-n lines

Energy (keV)

3.8

39

40

High-n doubly excited states and DR transitions are ignored in the codes

Lab measurements help us to identify these issues

Summary

- 1. Simple comparisons of calculated spectra revealed several issues in the latest atomic codes. For example,
 - Line emission in NEI cases (low-CS line data & CSD)
 - Bremsstrahlung profiles and RRC intensities
- 2. Agreement of different atomic codes does not always guarantee their accuracy both codes can be wrong.
 - Simulation experiments using EBIT would be useful

Comparisons for Fe Kα are also shown in the Appendix of M. Sawada et al., PASJ, 2019 <u>https://arxiv.org/abs/1903.02554</u>