Stanford

The basics of scientific presentation

Dan Wilkins

Kavli Institute for Particle Astrophysics & Cosmology

Stanford University

Outline

- Types of talk

- How to write a (scientific) talk

- Creating slides

- Presentation style

Two things to think about…

Who is your audience?

What do you want them to take away from your talk?

Your audience

- Your immediate colleagues, specialists in your research field

- Astronomers and astrophysicists, but in different fields

- Physicists, outside of astrophysics

- Enthusiasts, amateur astronomers, with some general knowledge

- The general public

Your audience

- What do your audience know?

- What background will you need to include?

- What will you need to explain?

- What do you want them to take away from your talk? What do they want to find out?

- What is irrelevant?

Conference talks

Conference talks

- **Specialist conference or workshop** — colleagues in your field

Conference talks

- **Specialist conference or workshop** — colleagues in your field

- **General astronomy or physics conference** — participants from many different fields

Conference talks

- **Specialist conference or workshop** — colleagues in your field

- **General astronomy or physics conference** — participants from many different fields

- **Review talks (invited)** — overview of work in a field

Conference talks

- **Specialist conference or workshop** — colleagues in your field

- **General astronomy or physics conference** — participants from many different fields

- **Review talks (invited)** — overview of work in a field

- **Long talks** — 15+ minutes, going into detail about one project

Conference talks

- **Specialist conference or workshop** — colleagues in your field

- **General astronomy or physics conference** — participants from many different fields

- **Review talks (invited)** — overview of work in a field

- **Long talks** — 15+ minutes, going into detail about one project

- **Short talks** — 5-10 minutes, really just highlighting one new result

Conference talks

- **Specialist conference or workshop** — colleagues in your field

- **General astronomy or physics conference** — participants from many different fields

- **Review talks (invited)** — overview of work in a field

- **Long talks** — 15+ minutes, going into detail about one project

- **Short talks** — 5-10 minutes, really just highlighting one new result

- **Lightning talk** — a very brief pitch, often with a poster ("come and talk to me later")

Seminars and colloquia

Stanford

Seminars and colloquia

- **Seminar or group meeting** — in depth discussion of a specific project or topic, with colleagues in your field

Seminars and colloquia

- **Seminar or group meeting** — in depth discussion of a specific project or topic, with colleagues in your field

- **Colloquium** — higher level review of a topic for a broader audience, either within an astronomy or physics department. Will be attended by faculty, researchers and students

Seminars and colloquia

- **Seminar or group meeting** — in depth discussion of a specific project or topic, with colleagues in your field

- **Colloquium** — higher level review of a topic for a broader audience, either within an astronomy or physics department. Will be attended by faculty, researchers and students

- **Job talk (!!)** — often a colloquium (but may be a shorter seminar), highlighting your research, what you have achieved, major results, and your plans for the future. Often for a broad audience.

Presentation structure

Stanford

Outline and conclusions

Outline and conclusions

"Tell them what you are going to tell them, then tell them, then tell them what you just told them"

Outline and conclusions

"Tell them what you are going to tell them, then tell them, then tell them what you just told them"

- Start with **outline** – brief summary of what you are going to talk about (bullet points)

Outline and conclusions

"Tell them what you are going to tell them, then tell them, then tell them what you just told them"

- Start with **outline** – brief summary of what you are going to talk about (bullet points)

- End with **conclusions** – summarise the important take-away messages from your talk

Tell a story

Tell a story

- Background and motivation

  - What are you talking about?

  - What questions are you trying to answer?

  - What's the bigger picture?

Tell a story

- Background and motivation

  - What are you talking about?

  - What questions are you trying to answer?

  - What's the bigger picture?

- What did you do?

  - What did you observe?

  - Experimental and analysis method(s)

  - What theory/models are you using?

Tell a story

- Background and motivation

  - What are you talking about?

  - What questions are you trying to answer?

  - What's the bigger picture?

- What did you do?

  - What did you observe?

  - Experimental and analysis method(s)

  - What theory/models are you using?

- What did you find?

Tell a story

- Background and motivation

  - What are you talking about?

  - What questions are you trying to answer?

  - What's the bigger picture?

- What did you do?

  - What did you observe?

  - Experimental and analysis method(s)

  - What theory/models are you using?

- What did you find?

- What does it mean? What do you conclude?

How much detail?

Often don't need to include all of the details of methods and analysis techniques (especially for short talks to general audiences)

Include enough to tell a coherent story

- Enough to show the motivation

- Enough to show where your results come from

If anyone wants to know more, they can ask you or read the paper!

You are the most important part of your presentation, not your slides…

Though you should still think about your slides

Creating slides

Your style, your way

But there's a few things to keep in mind…

Avoid too much text

This slide has too much text on it. It is densely packed and difficult for the audience to read. If you have too much text, your audience will be distracted, trying to read it all, and they will not listen to what you are saying.

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Duis et ante vel massa consectetur pretium. Nunc ultrices, elit eget consectetur rhoncus, erat felis pellentesque mi, malesuada suscipit libero tellus at nisl. Aenean venenatis nunc id aliquam vestibulum. Duis tellus mauris, vehicula eget efficitur scelerisque, hendrerit ut lorem. Ut sagittis metus et tincidunt viverra. Etiam vulputate volutpat consequat. Aenean scelerisque augue id fringilla suscipit. Integer posuere diam in sapien euismod, ut pulvinar tellus maximus. Praesent at mauris vel purus placerat ullamcorper. Ut cursus odio ac diam euismod mollis. Mauris sed quam lorem. Ut efficitur elit nisl, in mattis nisl imperdiet nec.

Nunc justo metus, elementum vitae mattis auctor, pulvinar vel risus. Aliquam ornare lacus eget nulla aliquam, in elementum nisl tempor. Interdum et malesuada fames ac ante ipsum primis in faucibus. Fusce dui neque, varius vitae dolor eget, cursus rhoncus diam. Fusce ligula sapien, dignissim non dolor eu, bibendum ornare metus. Mauris laoreet vulputate mauris, sit amet volutpat orci molestie in. Donec lacinia justo non semper scelerisque. Curabitur suscipit, enim eu blandit ornare, tellus lectus tincidunt ipsum, in maximus erat sapien vel mauris. Sed nec justo eros. Donec nec est tincidunt, pharetra ex et, convallis nisl. Integer a sapien urna. Mauris in libero vitae eros interdum lobortis ac at magna. Sed dolor lacus, mattis imperdiet tempus non, condimentum vel tellus. Nullam ante est, faucibus eu iaculis vitae, lacinia ac lorem.

Clear text

Clear text

- Short bullet points

Clear text

- Short bullet points

- Just enough text to emphasise key points

Clear text

- Short bullet points

- Just enough text to emphasise key points
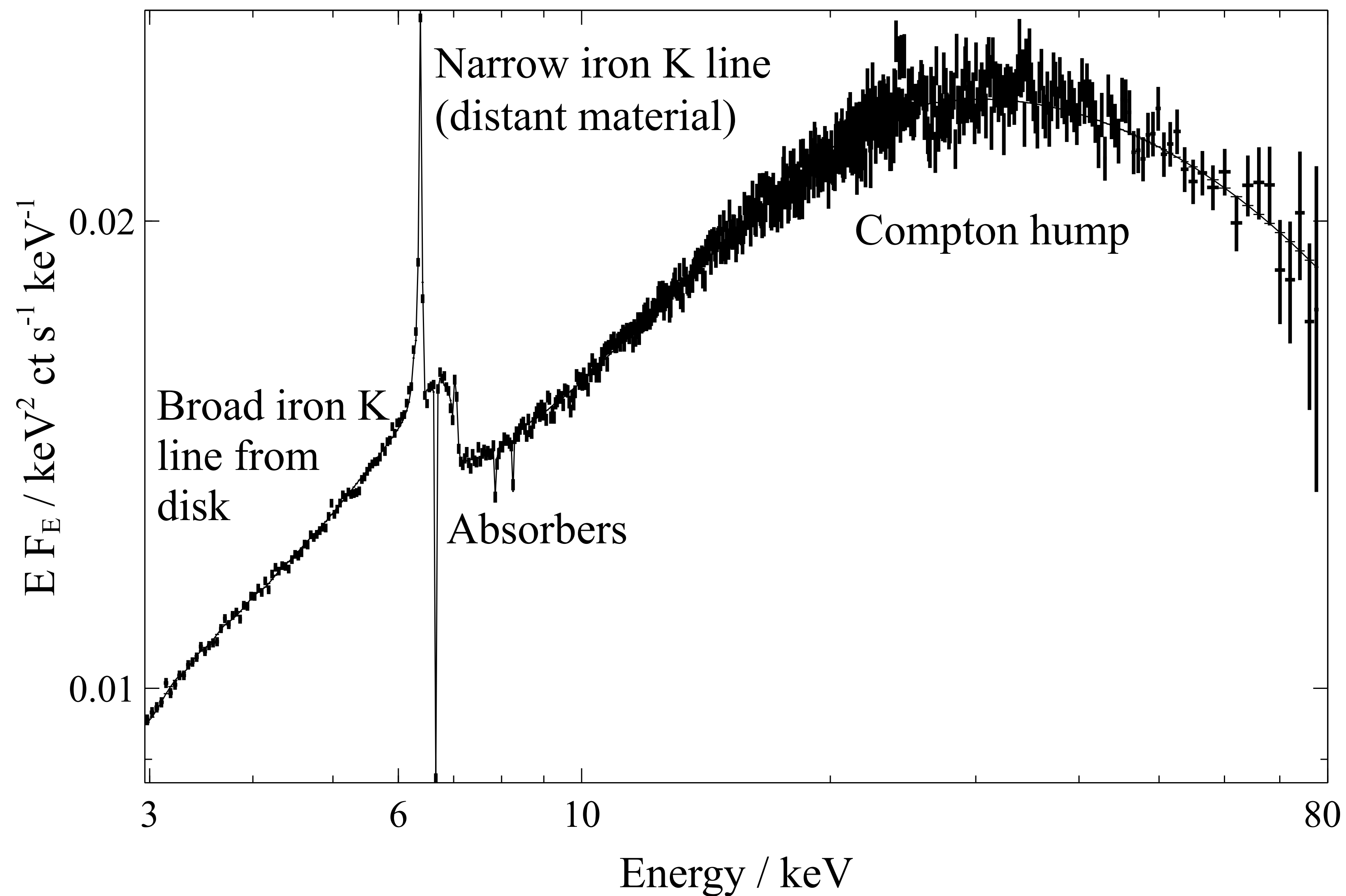
- Don't need to write everything

Clear text

- Short bullet points

- Just enough text to emphasise key points

- Don't need to write everything
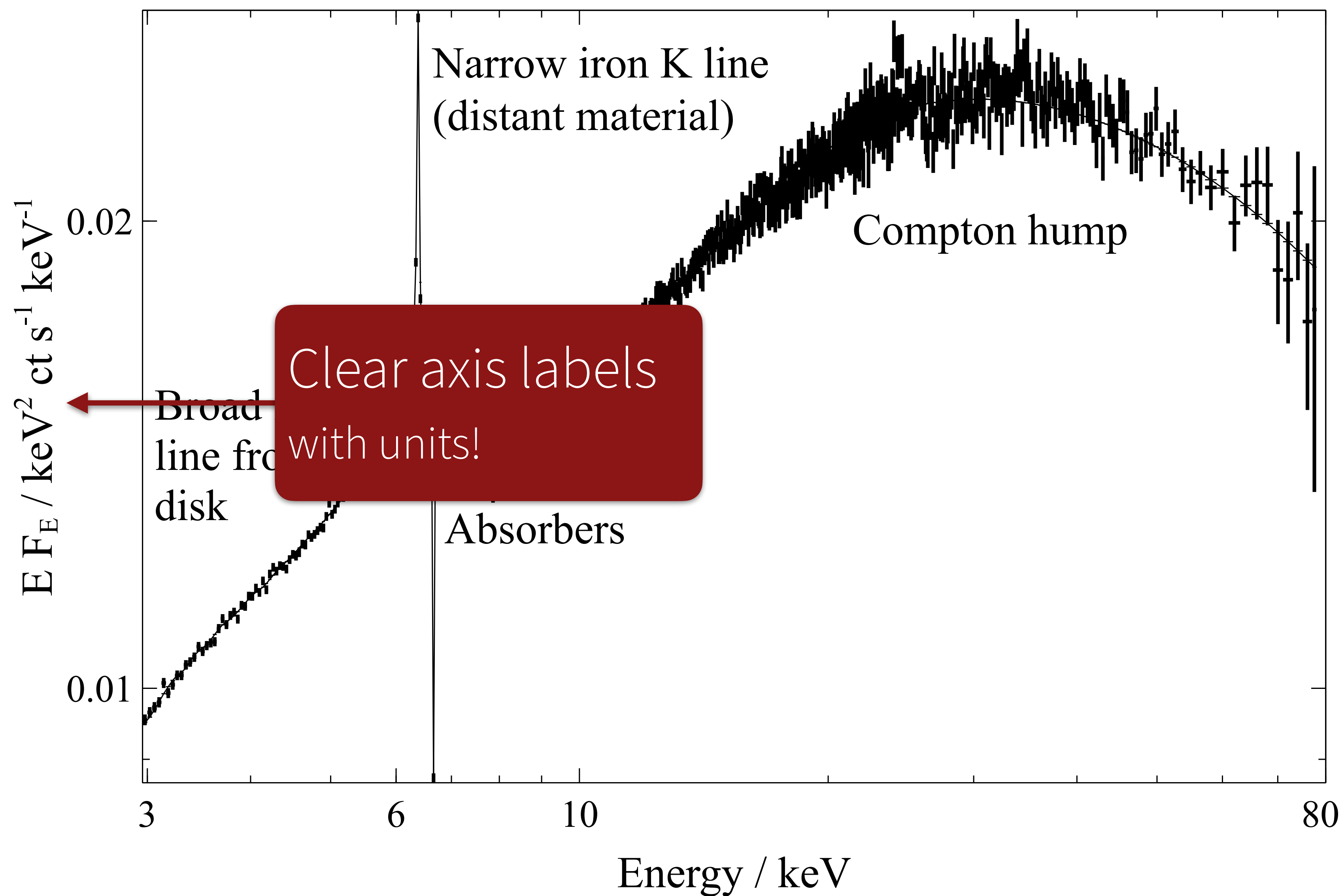
- Can say things not on the slide

Clear text

- Short bullet points

- Just enough text to emphasise key points

- Don't need to write everything

- Can say things not on the slide

- Sometimes clearer to bring in one bullet point at a time while talking

Figures

Narrow iron K line
(distant material)

Compton hump

Broad iron K
line from
disk

Absorbers

Energy / keV

Figures

Figures

Figures

Figures

Narrow iron K line
(distant material)

Label the key features

Compton hump

$E F_E$ / keV^2 ct s^{-1} keV^{-1}

0.02

Clear axis labels
with units!

Broad
line from
disk

Absorbers

Clear data points
and thick lines

0.01

3

Big, clear text

80

Energy / keV
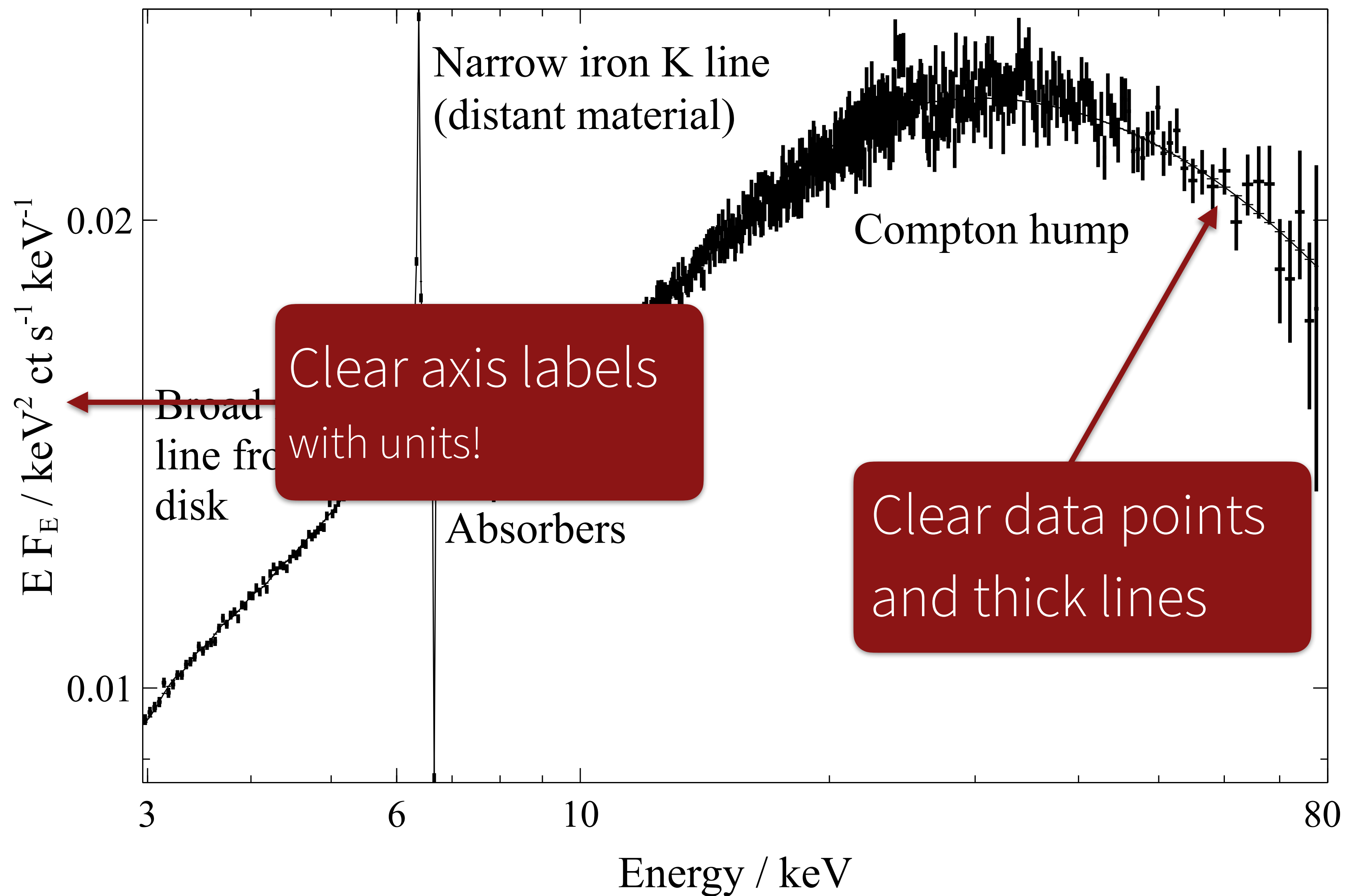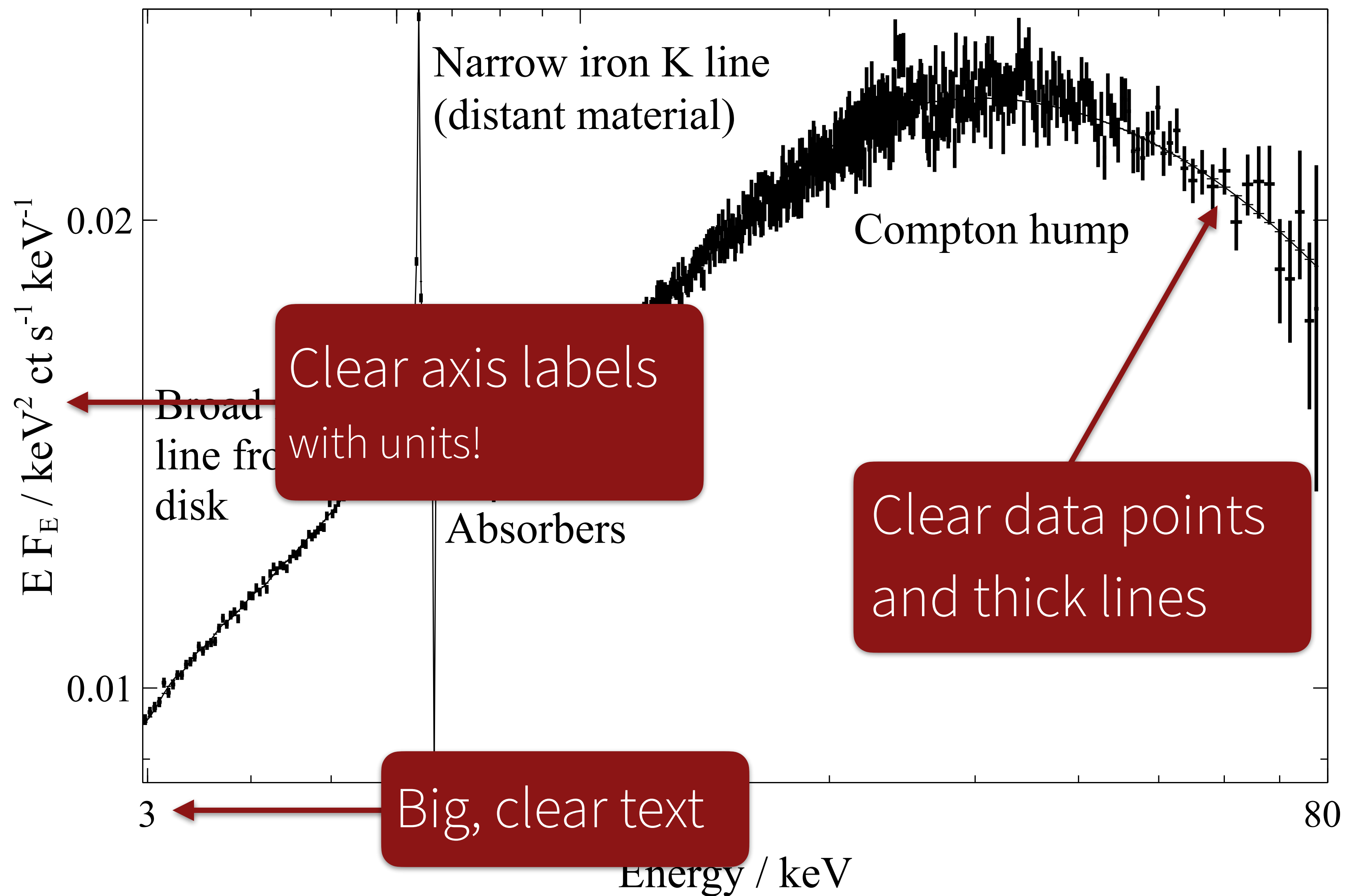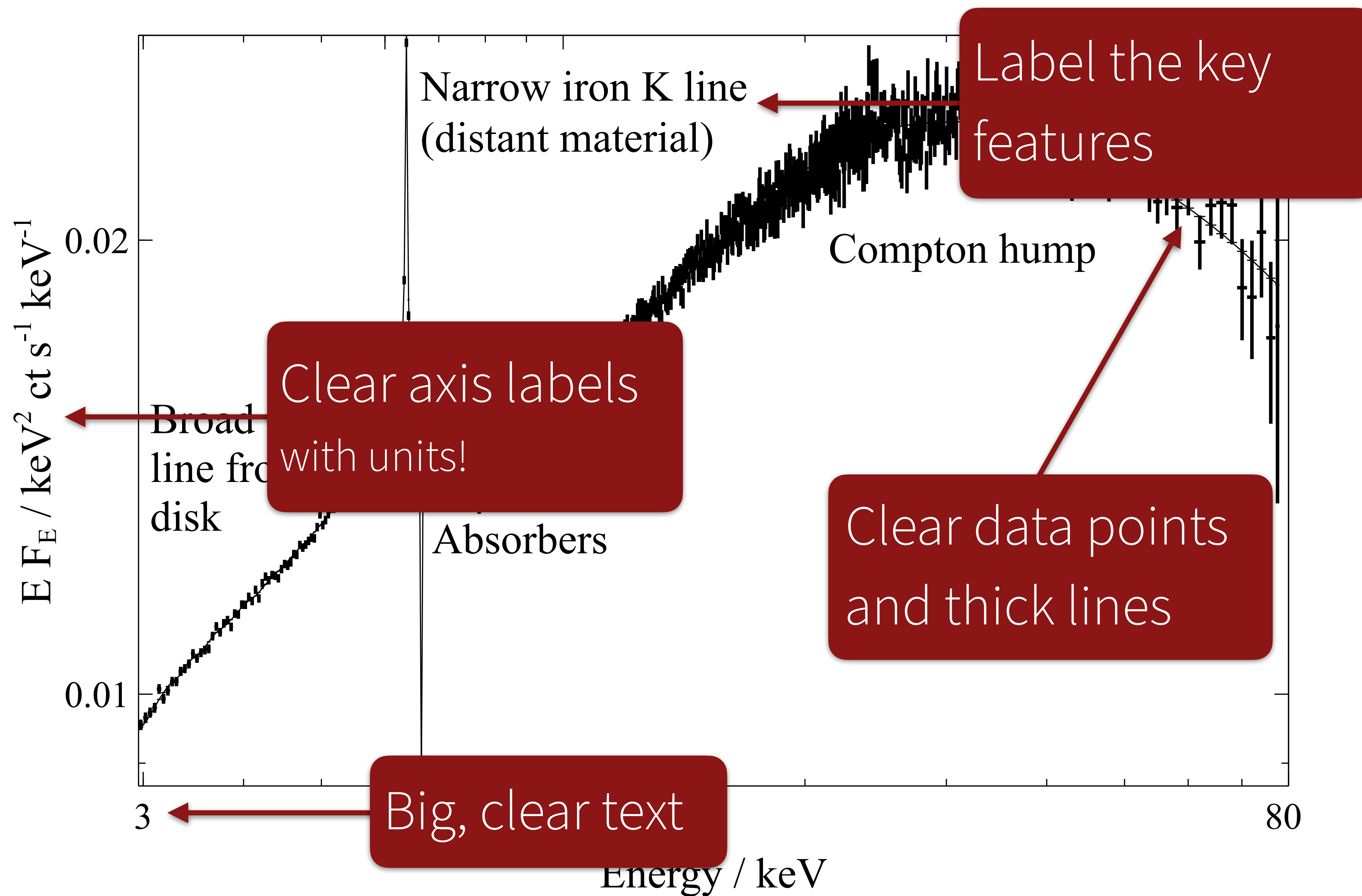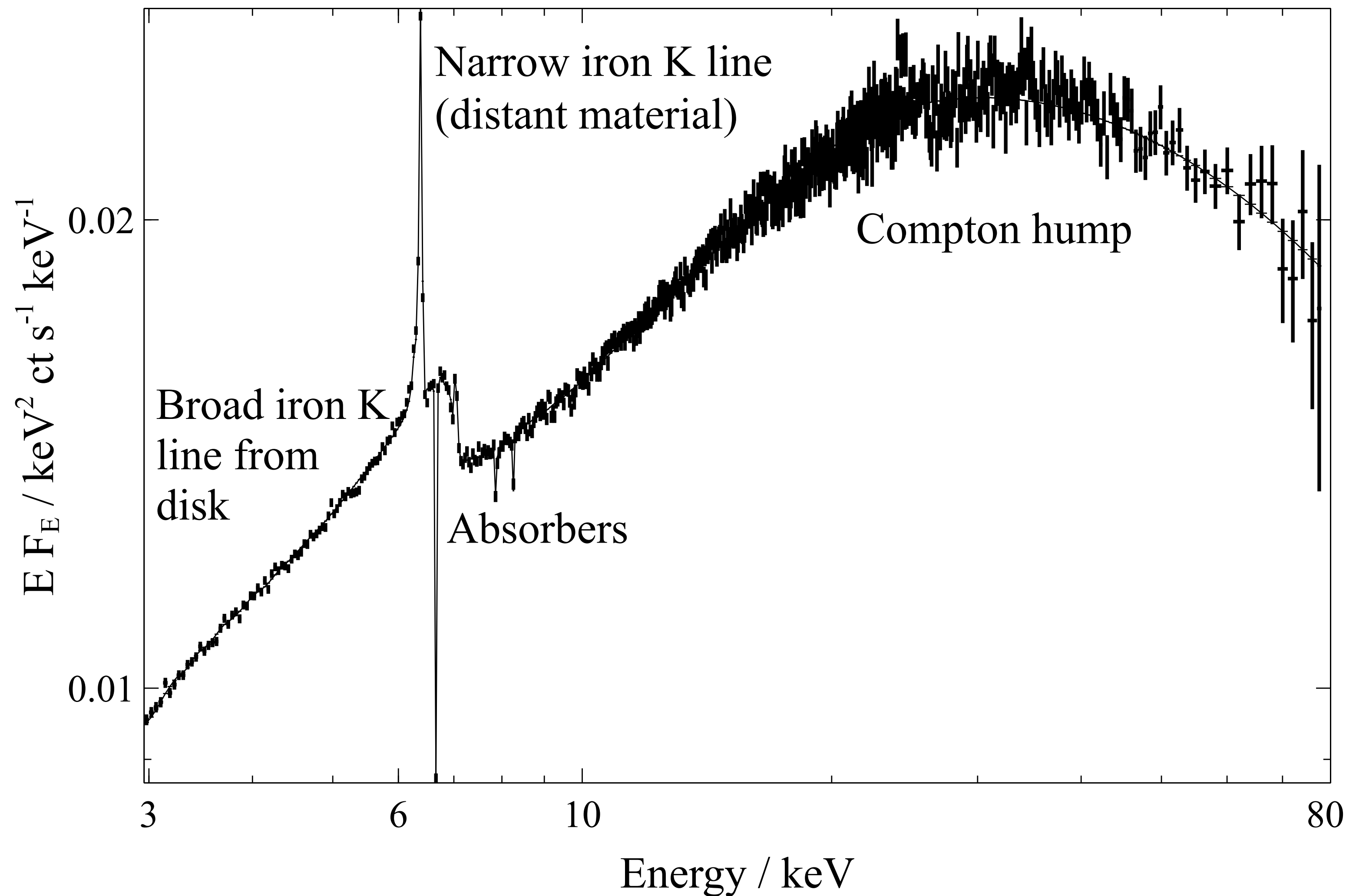
Figures

- Maybe with a few bullet points

- Highlight key points

- Talk about each figure

- Make sure your figures don't have too much extra information you're not going to talk about

Bad plots

- Small data points, faint colours

- Small text

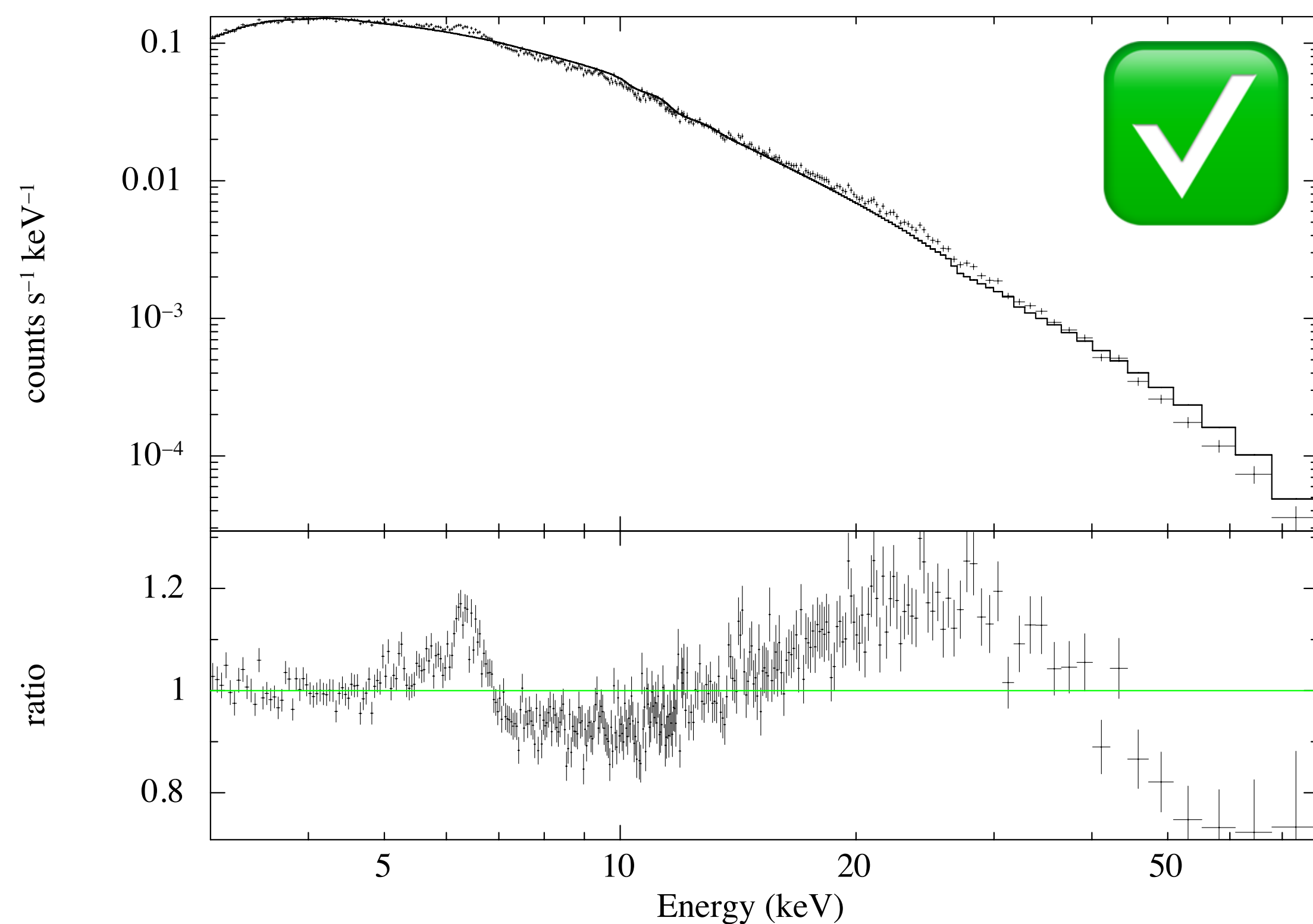- Unclear or no axis labels

- 2 data series, but no legend

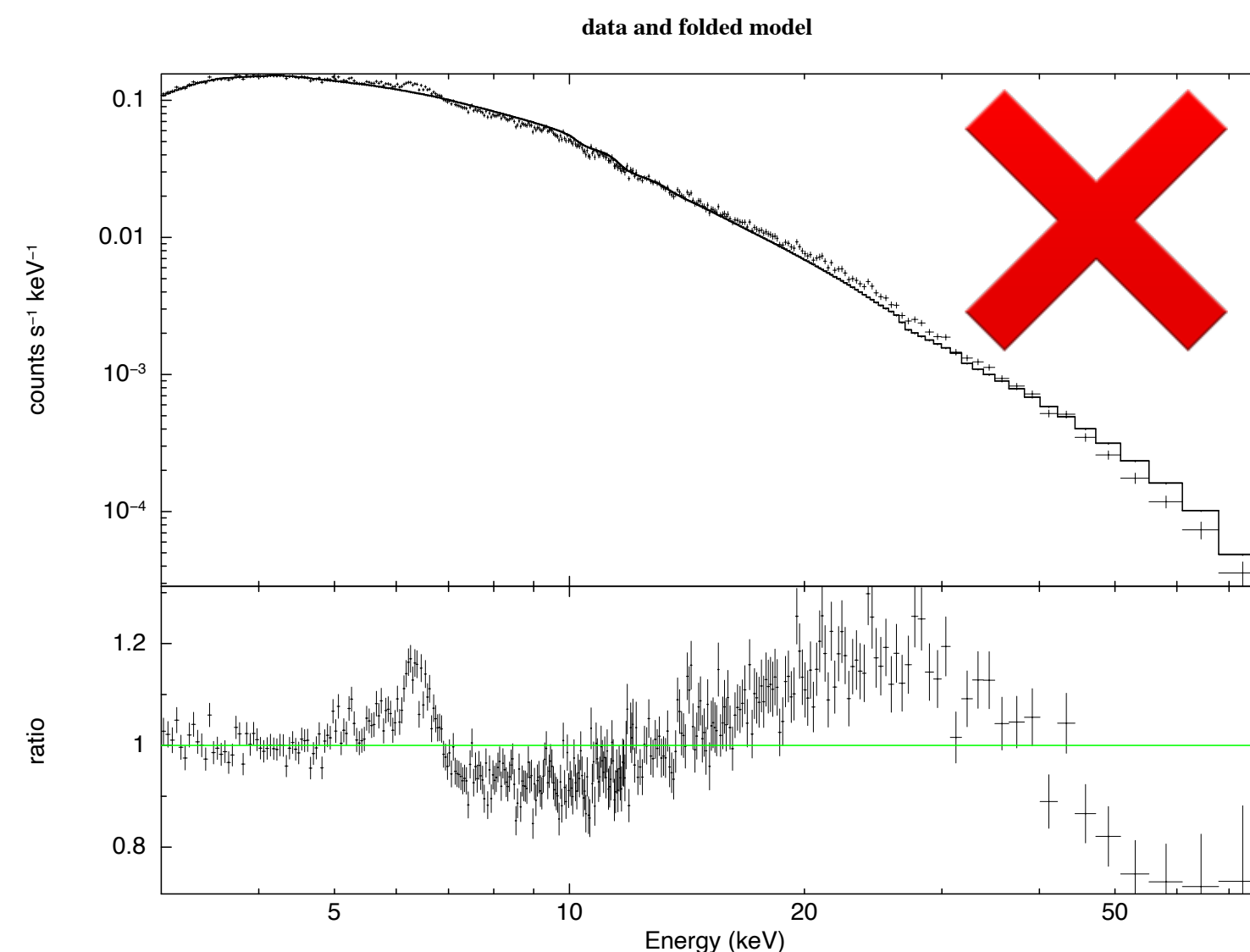Thin/faint lines

What even??
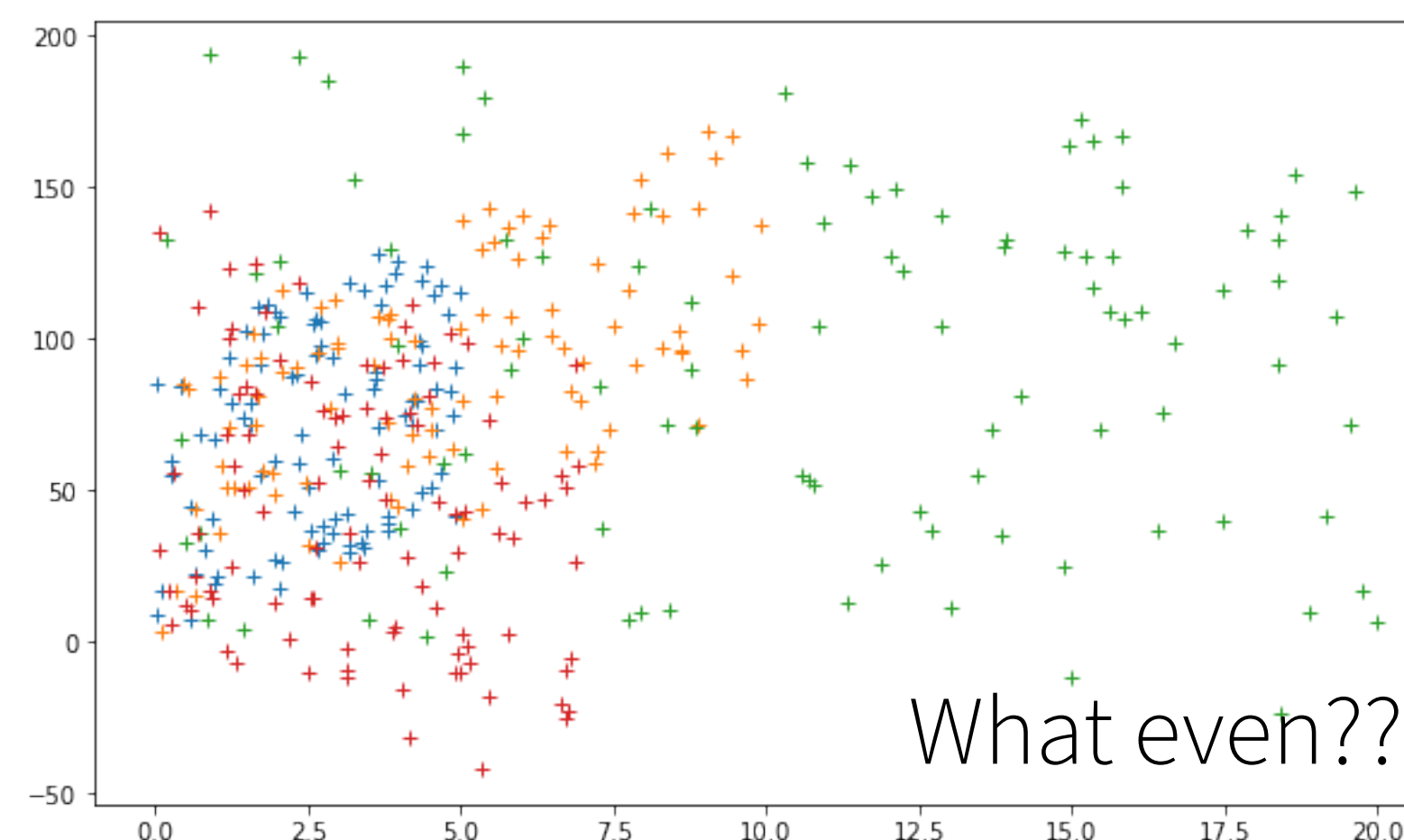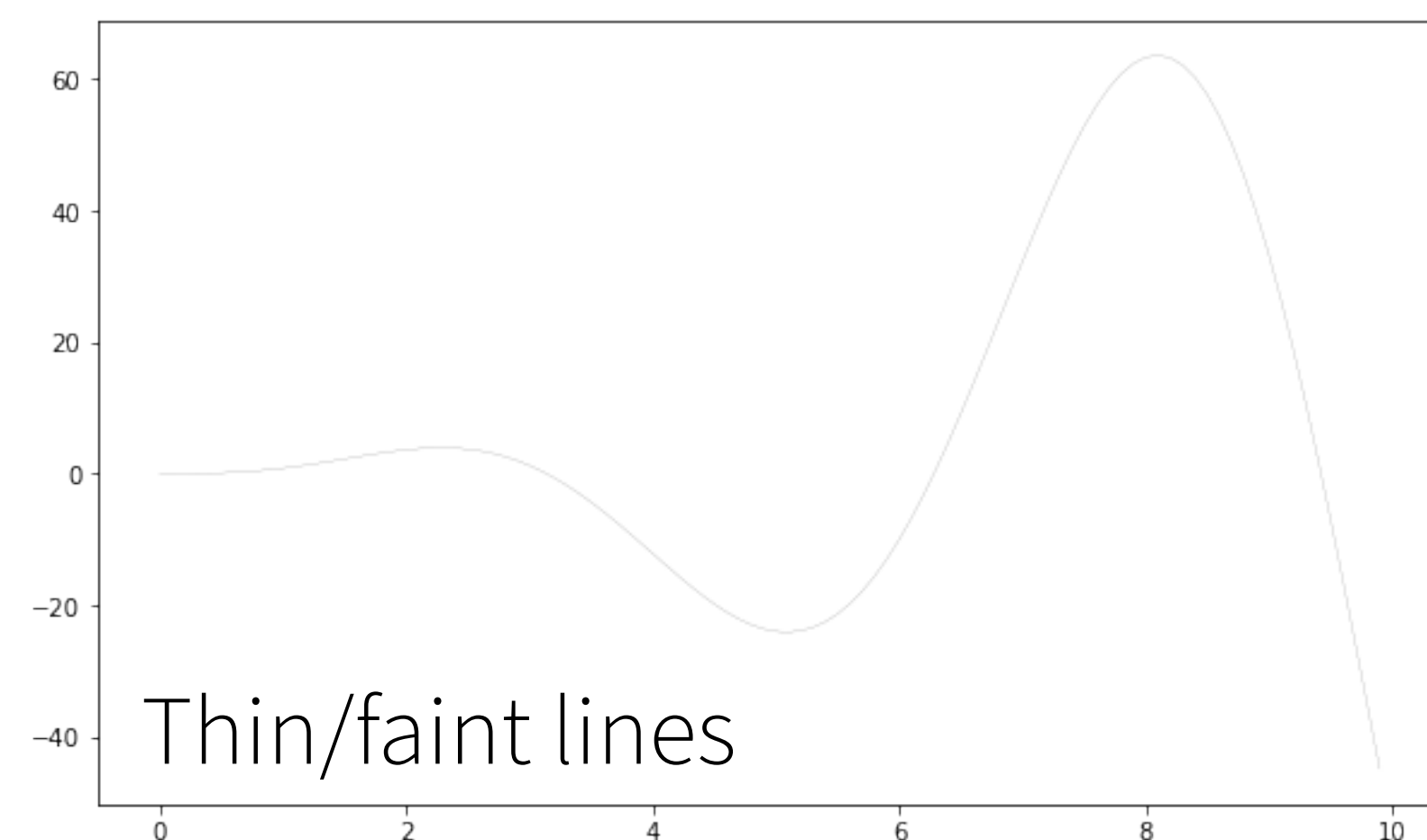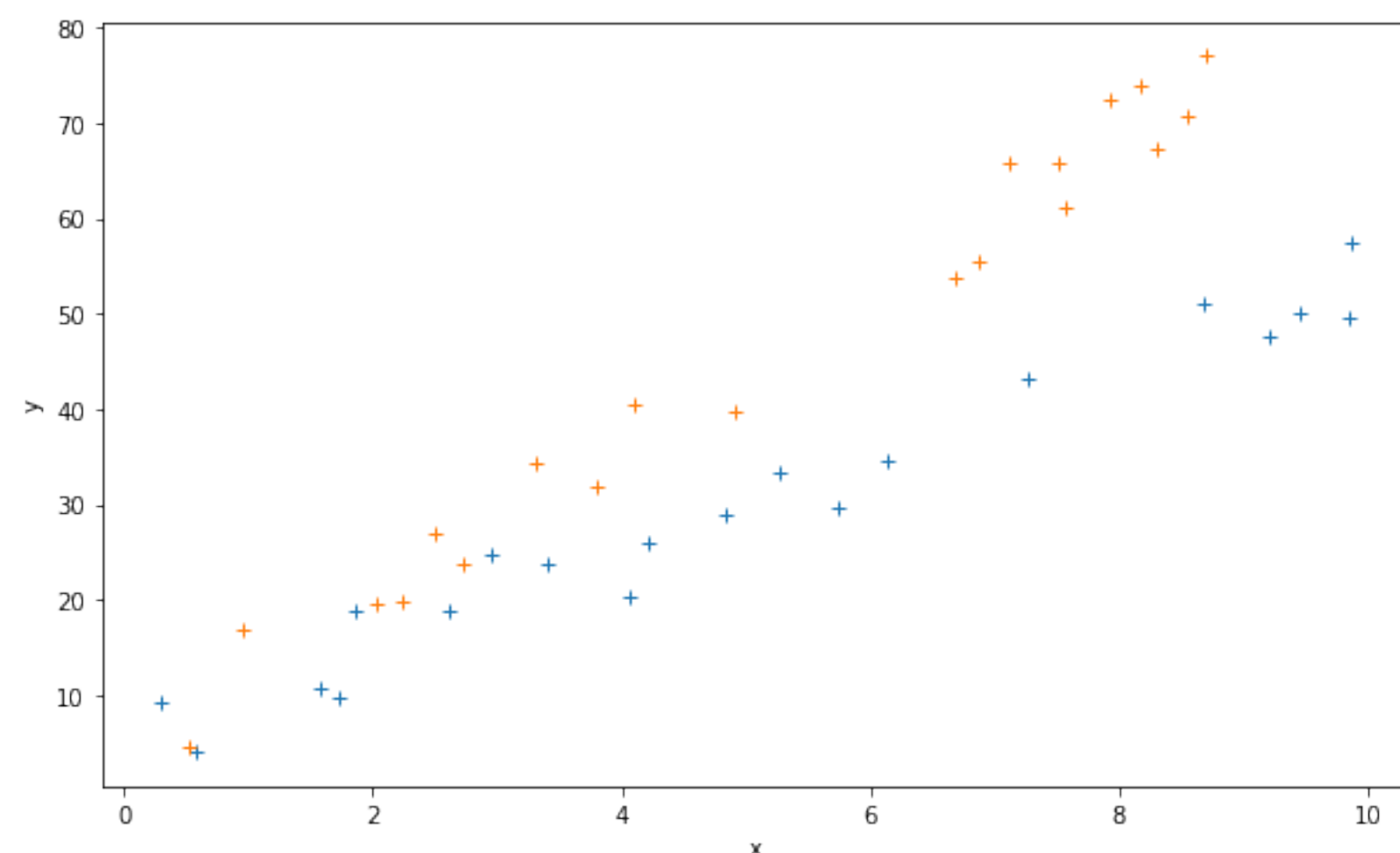
Don't crowd your slide!
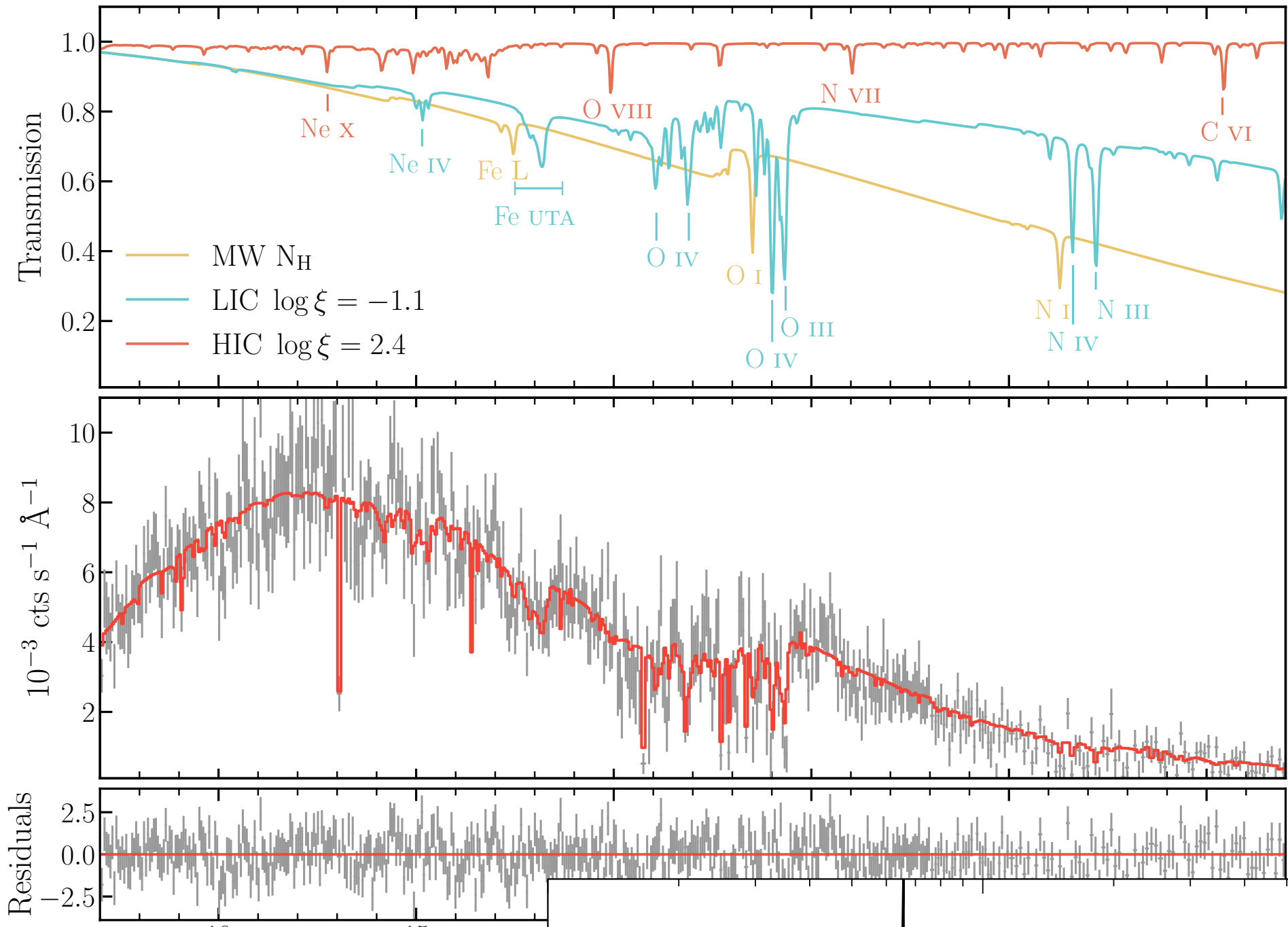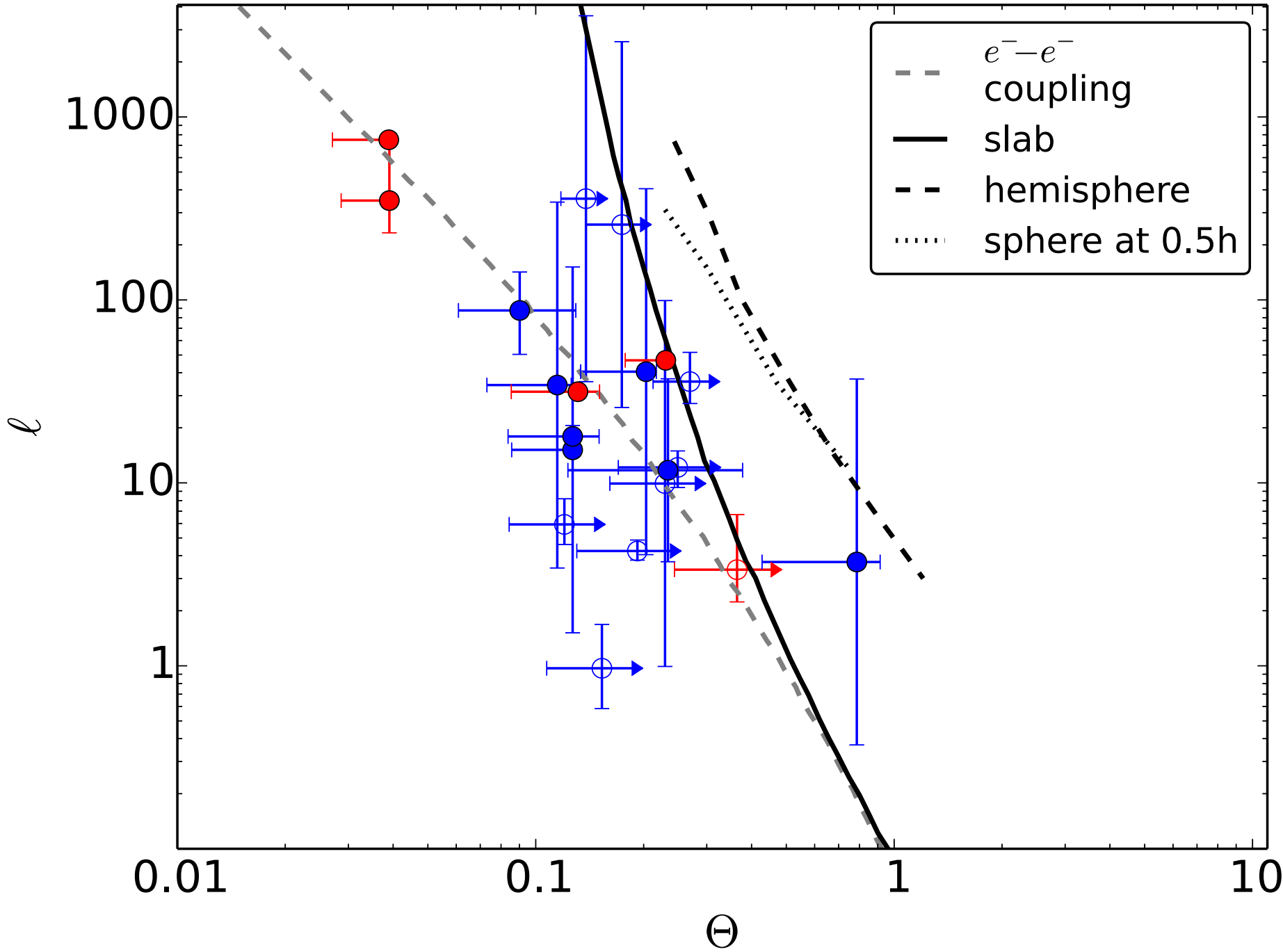
Did anyone notice this random bit of text??
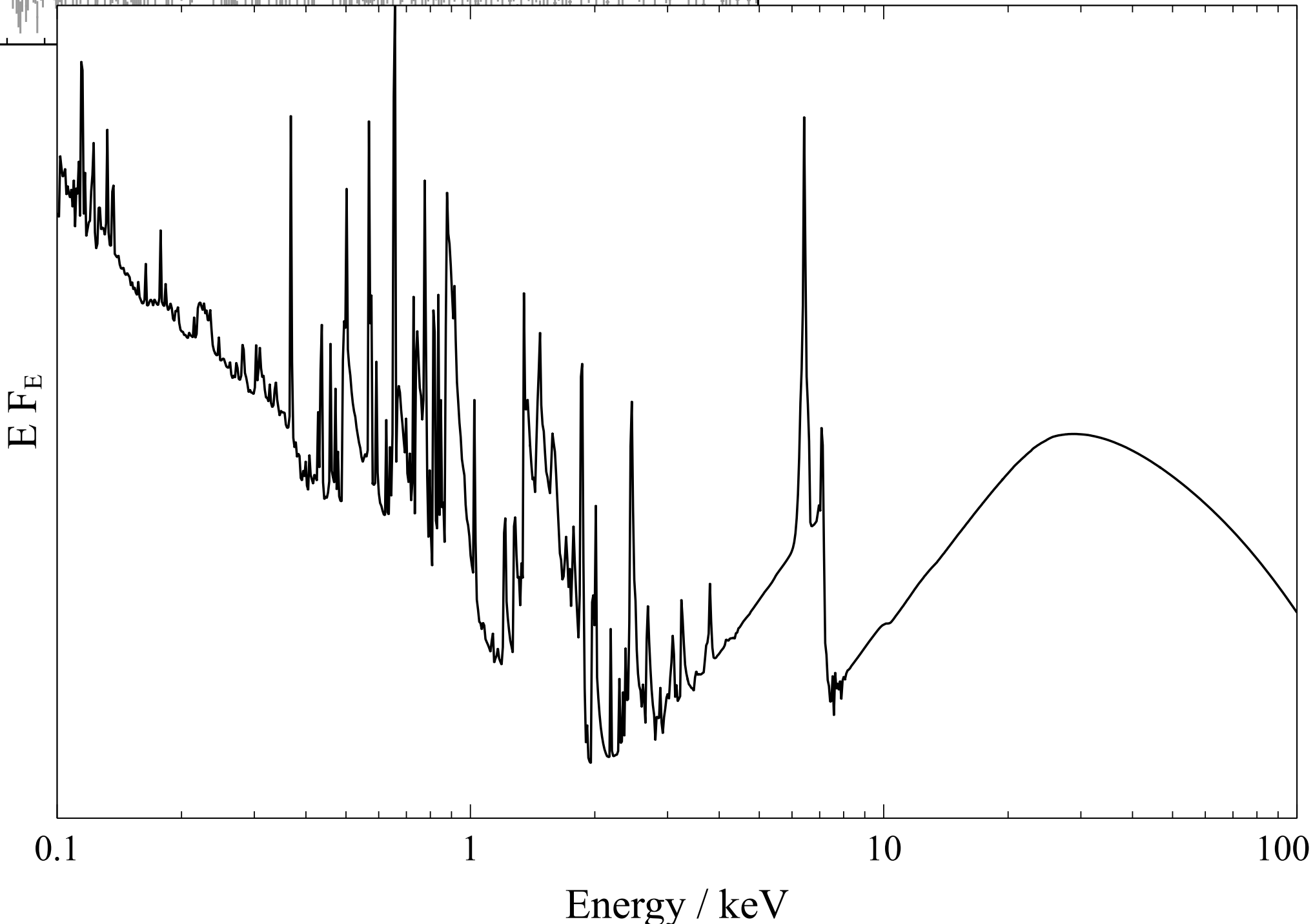
Don't fill a slide with unrelated figures

Better to show new plots or new results on a new slide and talk specifically about them

XSPEC plots

```
XSPEC12> iplot
PLT> fo ro
PLT> cs 1.2
PLT> lab t
PLT> tim off
PLT> myplot.ps/cps
```

Better yet, write the data to a text file (QDP format), then plot using your favourite plotting (matplotlib, Veusz)

```
XSPEC12> iplot
PLT> wdata data.qdp
```

21

Colours

- The safest colour schemes use dark (black, grey, dark blue) text on a white background

  - Will be visible even on the worst projector in a brightly lit room

- Avoid light colours like yellow, green and cyan

  - Don't use these colours in your figures either!

Fonts

- Big, clear text

  - Don't know how big the screen is and how far away people may
    be sitting

- **Sans serif fonts** (Arial, Helvetica, Gill Sans, Source Sans Pro, etc.),
  are usually clearer on projectors and screens than **serif fonts**
  (Times New Roman, Palatino etc.). Best to avoid *italic fonts*

Light on dark?

- Can look good for astro talks (particularly public talks)

- But be aware that light text on dark background may be less clear on low quality projectors in bright rooms

Public talks

- Clear graphical slides

- Minimal text (they want to hear you speak, not read!)

- Avoid plots

  - The public are not as familiar with scatter plots, spectra, light curves etc. as we are!

  - If you must include one plot, make sure you talk through it carefully

Presentation style

Keep to time!

- Do not run over your allocated time

- It's useful to be able to see a clock (e.g. your phone)

- Leave time for audience questions (e.g. 10 minutes = 7 minutes talk + 3 minutes questions)

- 1 to 1.5 minutes per slide

  - 7 minutes = how many slides??

- Know your milestones (e.g. half way point)

- Know what you can skip if you run short on time (e.g. that extra detail slide)

Talk to your audience

- Look at your audience (but don't keep staring at one person)

- Stand behind the podium or stand in front?

  - Up to you but don't hide in a corner!

- Engage them, bring them in

- Can take cues from your audience

  - Do they look confused? Do you need to explain something in more detail? (keep an eye on the time)

  - But don't worry too much about what individuals may be doing!

What to say

- Don't just read the text on the slide

- Talk through the slide in a logical order

    - Animations to bring in text, figures or labels

- Don't rush! Take your time, speak clearly, and emphasise key points

- Don't show extra material on a slide that you aren't going to speak about

- Use a pointer — but use it clearly and sparingly

And pause…

Presenter view (Keynote, PowerPoint, Google Slides) is your friend

Questions

- **Make sure you leave time!**

- Don't be afraid of questions!

  - Clarifying something you said

  - Have you considered…?

  - What if…?

  - "It's more of a comment than a question…" (!!!)

- Can take a moment to consider your answer

- Don't be afraid to say "I don't know"

  - "That's a really interesting idea"

  - "That's something I'd have to check"

  - "Maybe we can talk later"

Practice!

- Know what you are going to say

- Know what comes next

- Know how long it will take

- Know your milestones — which slide is the halfway point?

Summary

- Think about your audience and what you want them to take away from your talk

- Different talk formats for different settings

- Create clear slides with clear figures

- Keep to time

- Speak clearly and don't rush

- Practice