

APPENDIX: An Iwasawa-Taniguchi Effect for Compton-thick AGN

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REFERENCES

- Asmus D., Gandhi P., Hönig S. F., Smette A., Duschl W. J., 2015, *MNRAS*, **454**, 766
 Gandhi P., et al., 2013, *ApJ*, **773**, 51
 Gandhi P., et al., 2014, *ApJ*, **792**, 117
 Ricci C., Ueda Y., Koss M. J., Trakhtenbrot B., Bauer F. E., Gandhi P., 2015, *ApJ*, **815**, L13

All spectra presented here are plotted with energies in the source observed frame on the lower axis, with the source rest-frame energy shown on the upper axis. Sources with an additional `apex` component included in the spectral fit are shown with a corresponding label in their legend.

The grouping used is annotated on each plot and has one of two possibilities:

- (i) Binning by a minimum number of counts per bin.
- (ii) Binning to have a minimum S/N ratio in each bin.

All sources were fitted with a simplified phenomenological model consisting of photoelectric absorption acting on a composite powerlaw (Γ , the photon index of the powerlaw was assigned to 1.4 for all cases) plus a narrow Gaussian of FWHM ≈ 2 eV ($\sigma = 1$ eV), modelling the observed continuum and narrow core of the FeK α fluorescence line, respectively. See Section 3.3 for further details on the spectral model adopted. The corresponding confidence contours shown (where applicable) in the top right panel illustrate a delta statistic of +2.30 to represent the 1- σ (68%) confidence level for two interesting parameters★

All spectra shown feature the spectral fit to the data and the DEL for the fit in the top and bottom panels, respectively. DEL is defined as the (data – model)/error.

★ <https://heasarc.gsfc.nasa.gov/xanadu/xspec/manual/XSappendixStatistics.html>

APPENDIX A: SOURCES EXCLUDED

NuSTAR data was not publicly available for 19/55 low redshift sources from the *Neil Gehrels Swift*/BAT sample of Ricci et al. (2015), and so were excluded from this work. See Section 2.2 for more information. This excluded ESO 565-G019, which is in the Gandhi et al. (2014) bona-fide Compton-thick AGN sample, and has been studied individually in Gandhi et al. (2013) with *Suzaku* data.

In addition, our own analysis of the archival archival XMM-*Newton* EPIC/PN spectrum as compared to the more recent *NuSTAR* FPMA & FPMB spectra strongly indicated a changing-look AGN scenario for NGC 4102 and NGC 4939. These sources were thus excluded since changing-look AGN could adhere to variable obscuration effects.

Finally, 5 sources had observed rest-frame 2–10 keV fluxes in agreement with the interpolated rest-frame 12 μ m flux, predicted from the relation presented in Asmus et al. (2015). These 5 sources were ruled out from our sample, and their spectra are shown in Figure A1.

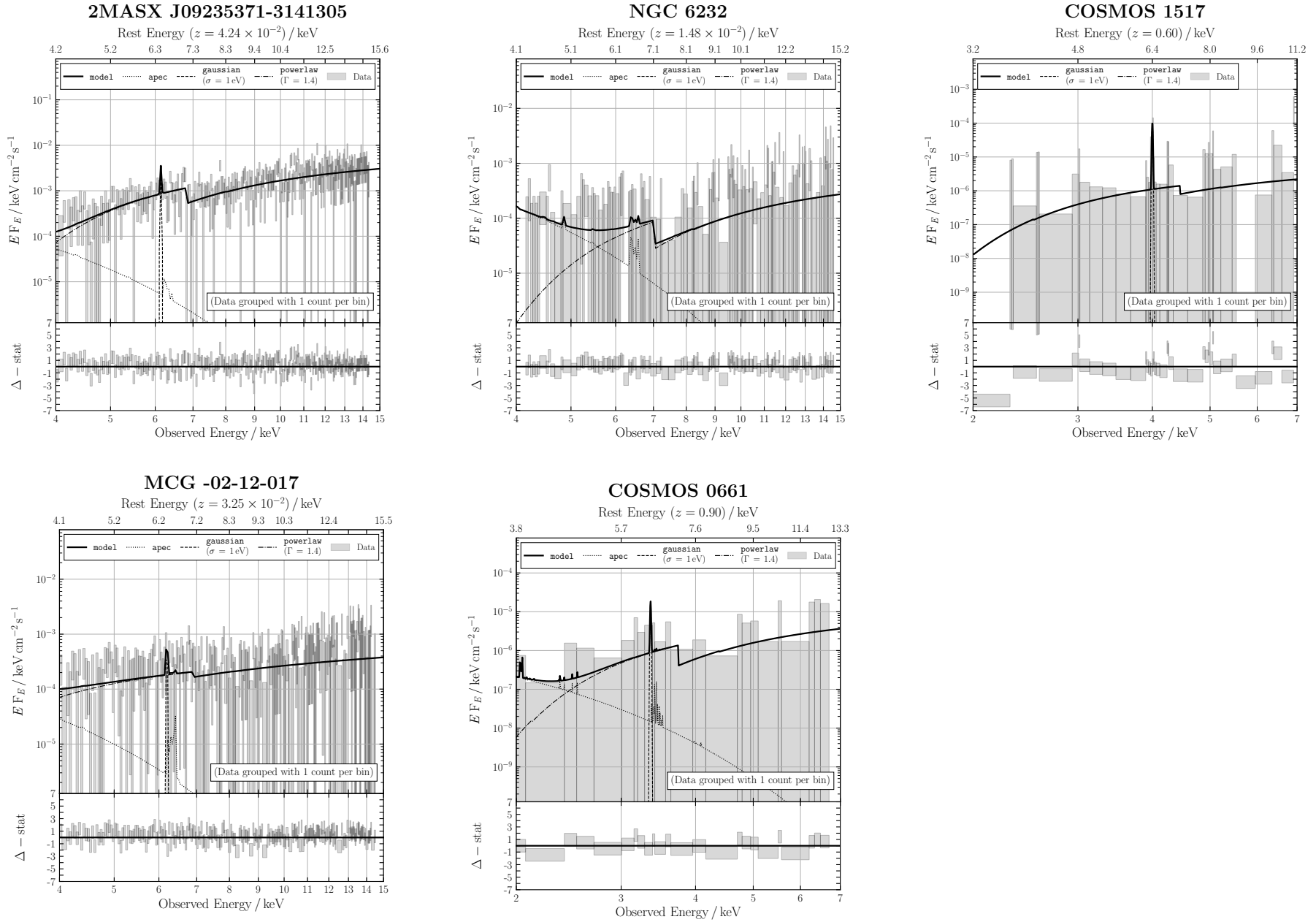


Figure A1. Spectra of the 5 sources ruled out in our analysis due to an agreement with the [Asmus et al. \(2015\)](#) correlation between observed X-ray and mid-infrared luminosity, which can infer less than Compton-thick obscuration. For details of the spectrum, see the description at the start of the Appendix. The top and bottom panels show the spectral fit to the data and the DEL for the fit, respectively. DEL is defined as the $(\text{data} - \text{model})/\text{error}$.

APPENDIX B: SOURCES INCLUDED

Here we include individual spectra and equivalent width (EW) contours for the sources we derive EWs for ourselves. The sources are ordered in ascending $12\mu\text{m}$ luminosity, as in Table 1 of the paper. We used the limit derived from best-fit parameters for 3 sources that the contour method did not provide a reasonable constraint for. These sources are: COSMOS0581, COSMOS 0987 and CDFS 460. Furthermore, due to an unphysical EW determined for CDFS 443, CDFS 454 and COSMOS 2180, we fixed the EW for these sources to be $< 5\text{ keV}$.

The upper right panel for each source figure indicates the contour plot for the EW, with the grid best-fit values shown as faint grey points. Statistical details of the spectral fit are tabulated in the bottom right panel of each source figure. All uncertainties shown from the intersection of the horizontal black line with the solid line contour correspond to the 68% confidence level for two interesting parameters.

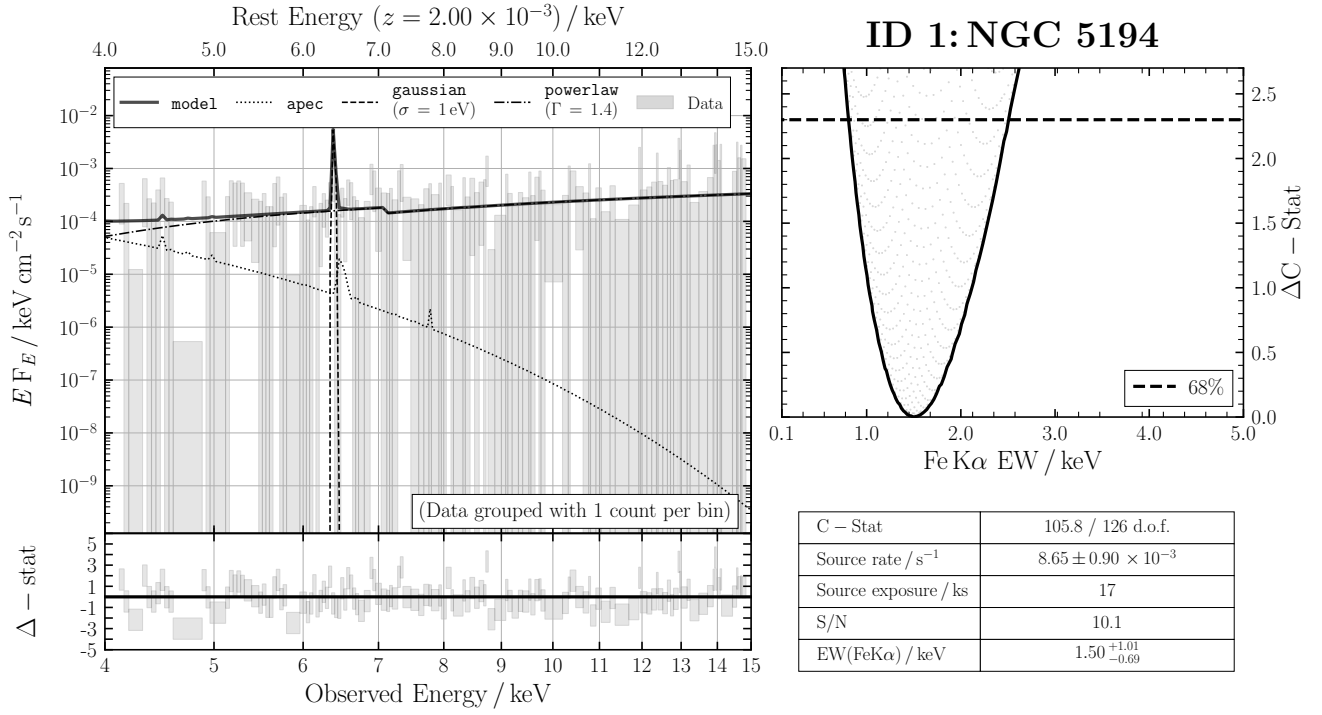
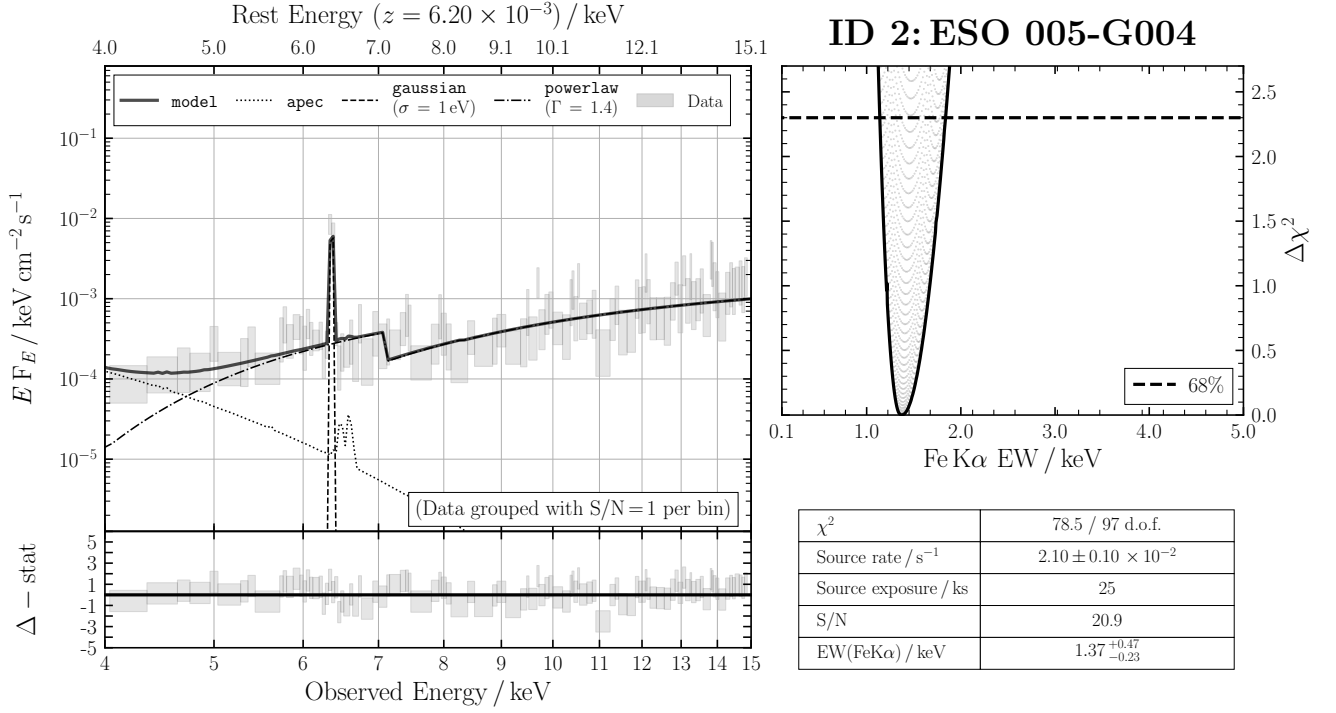
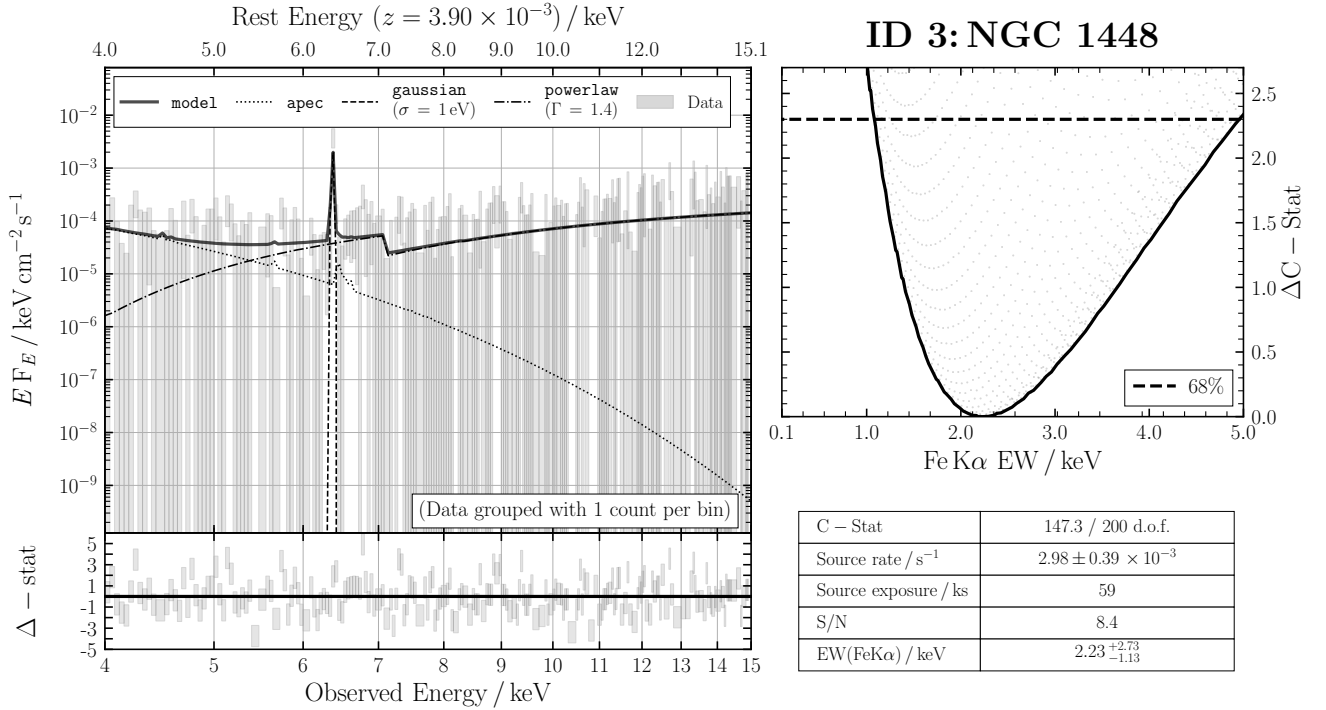
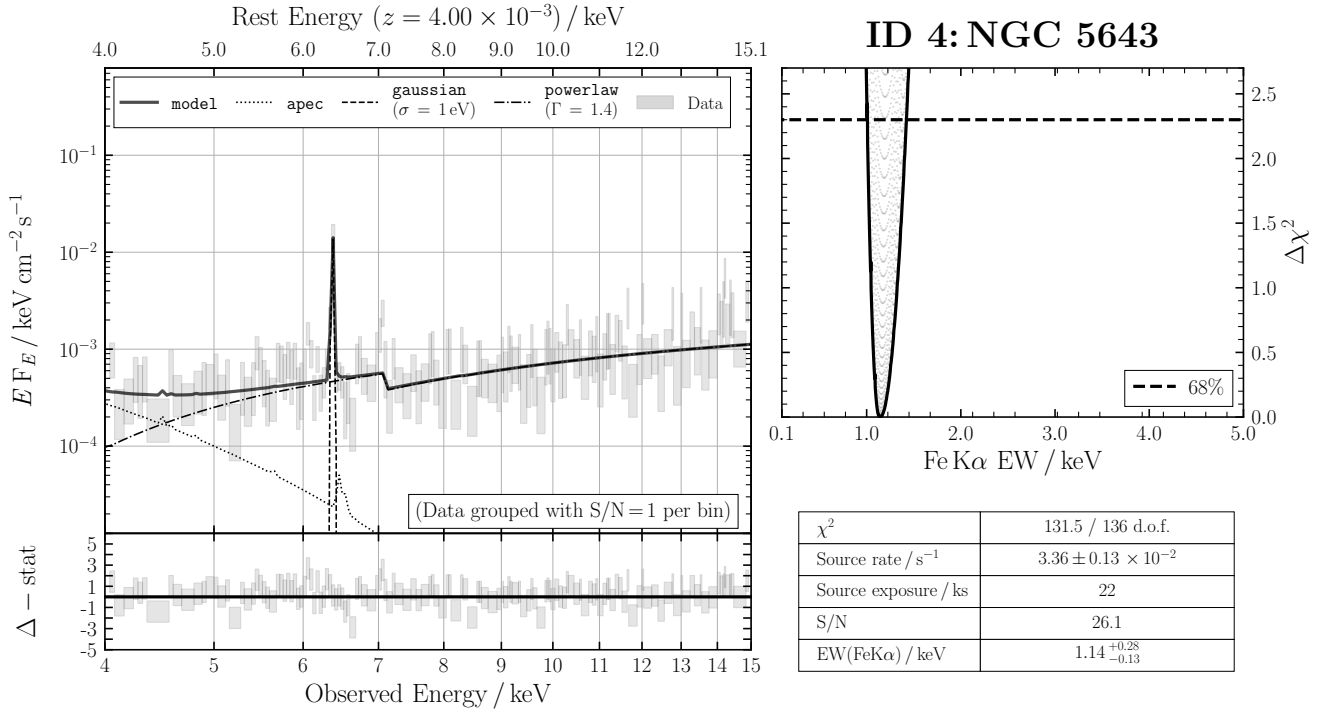
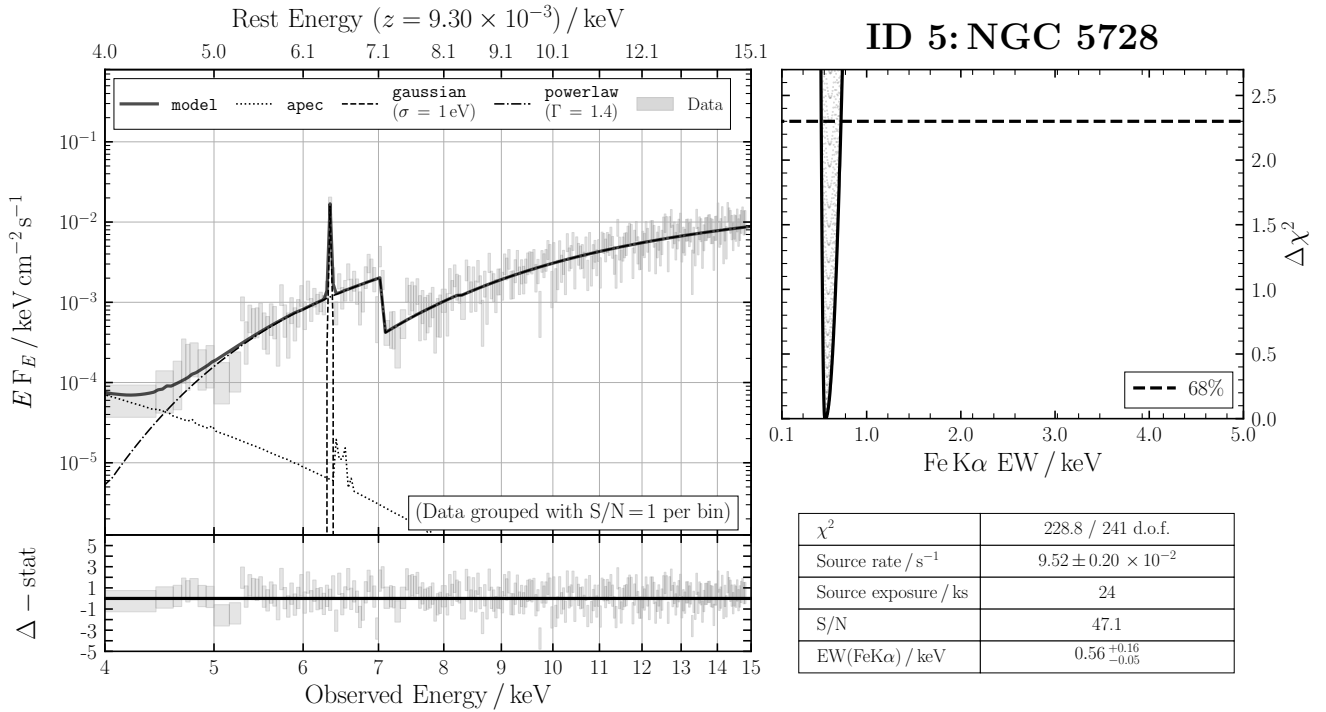


Figure B1. ID 1: NGC 5194

This paper has been typeset from a $\text{\TeX}/\text{\LaTeX}$ file prepared by the author.


Figure B2. ID 2: ESO 005-G004

Figure B3. ID 3: NGC 1448

**Figure B4.** ID 4: NGC 5643**Figure B5.** ID 5: NGC 5728

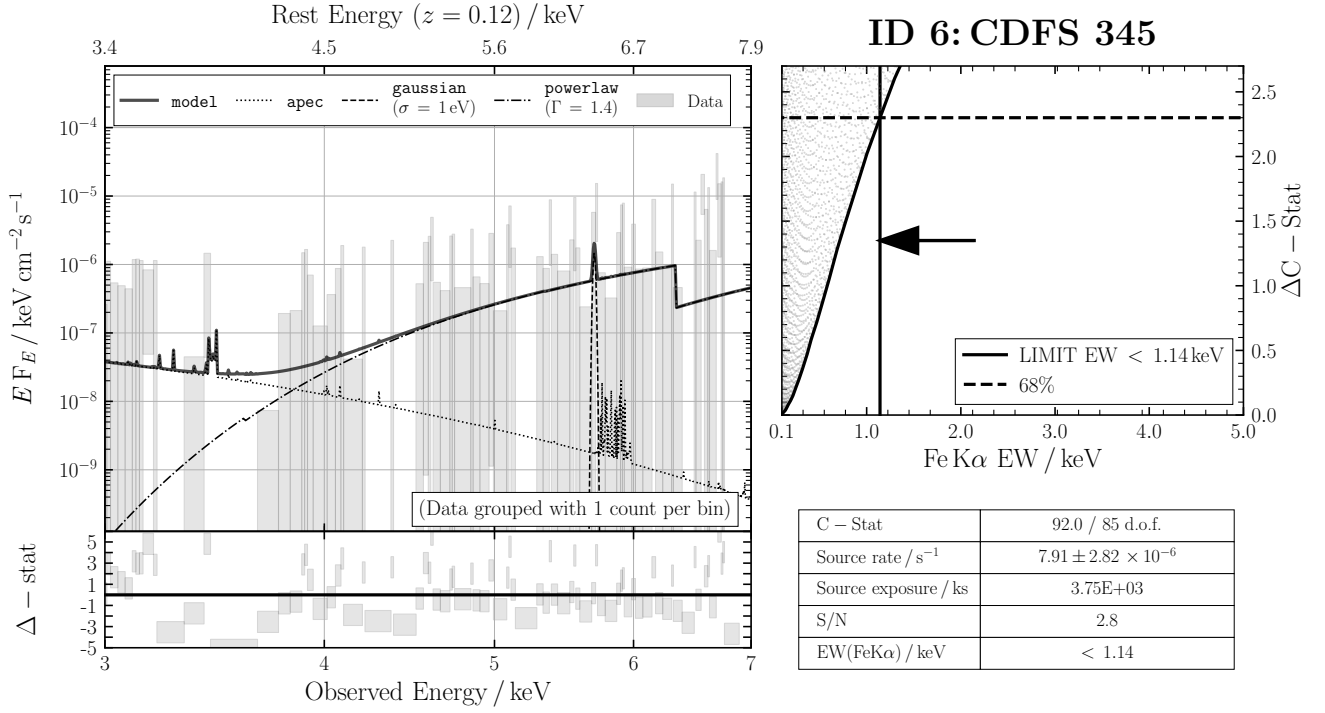


Figure B6. ID 6: CDFS 345

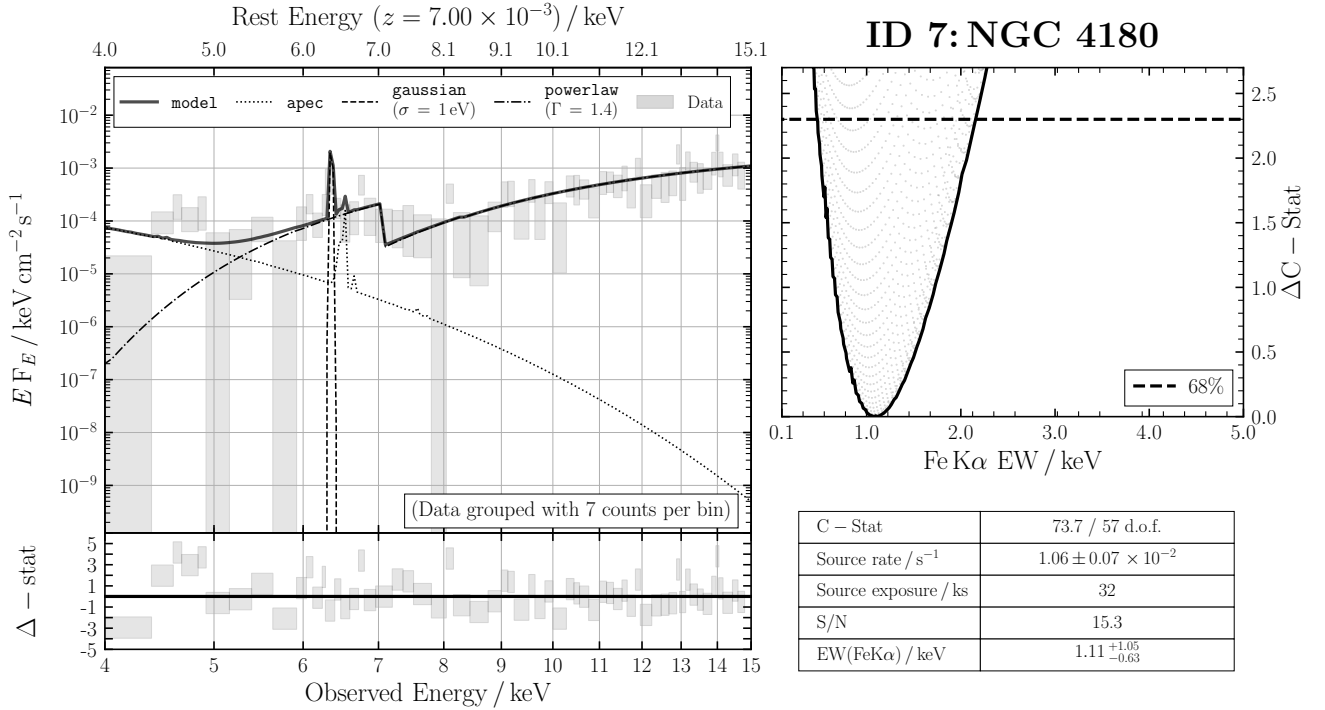
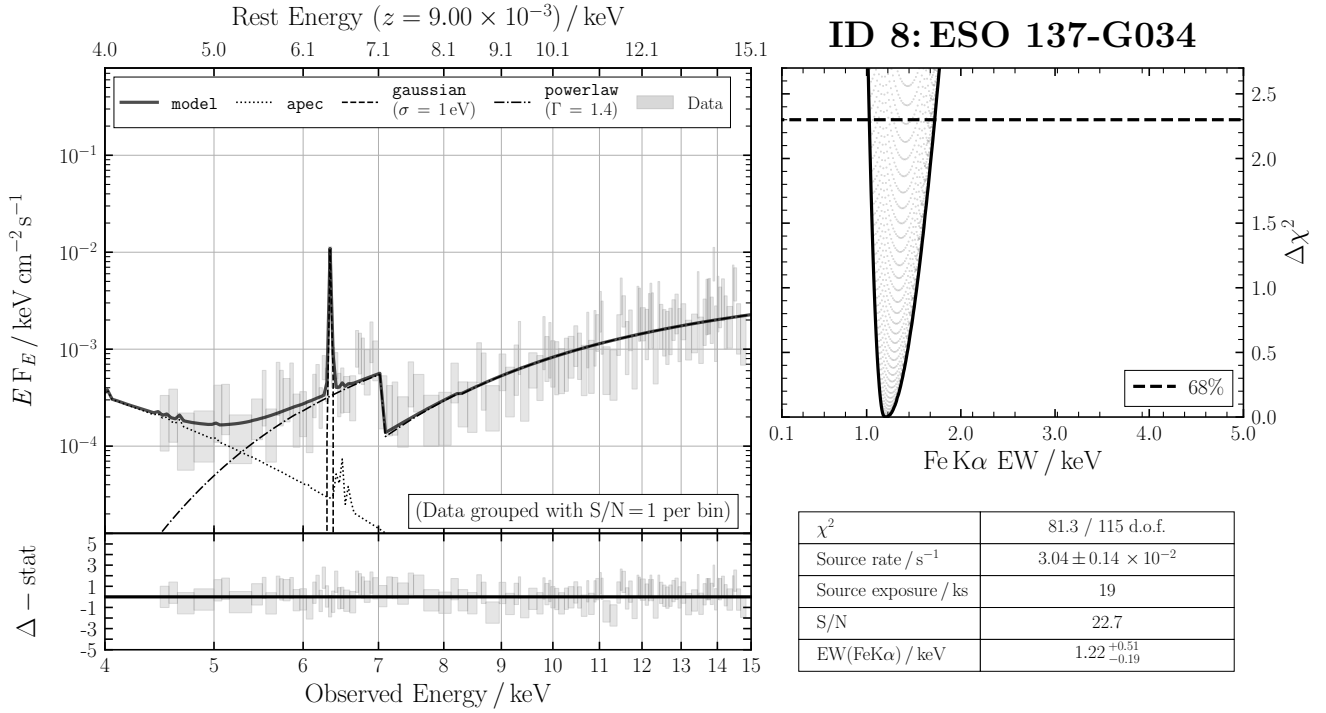
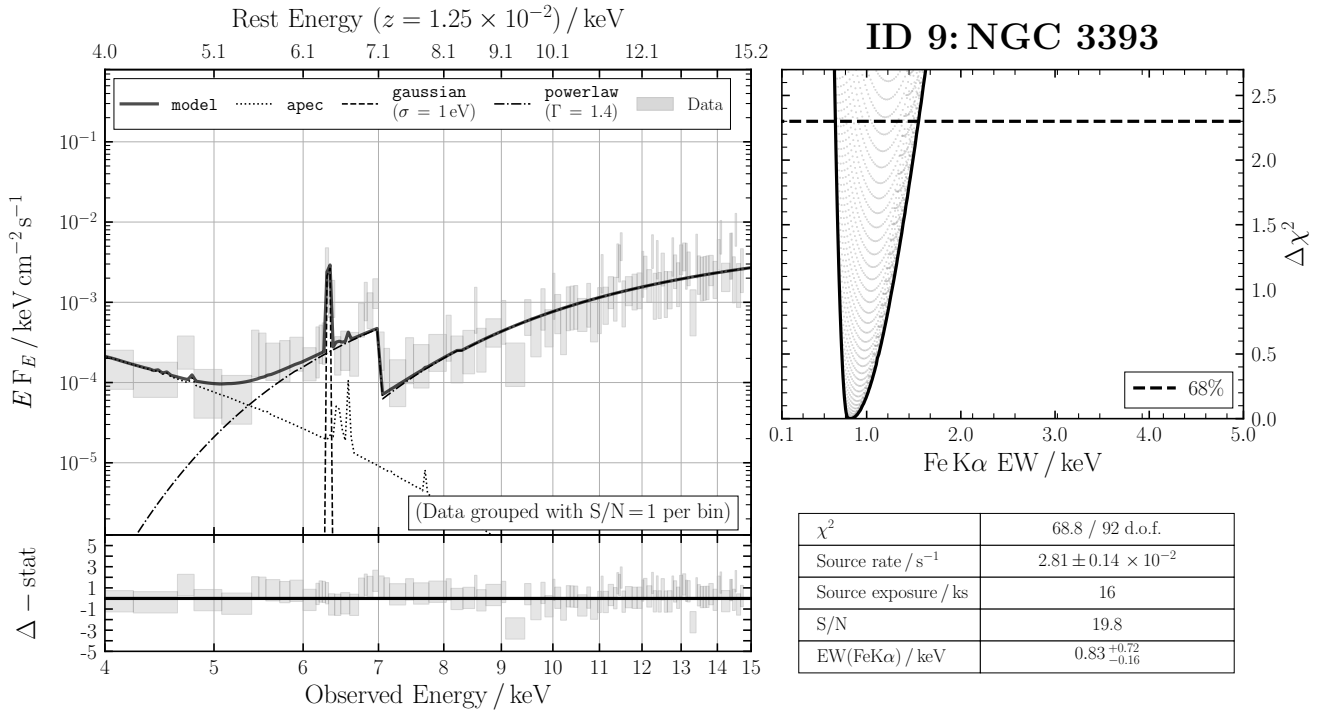
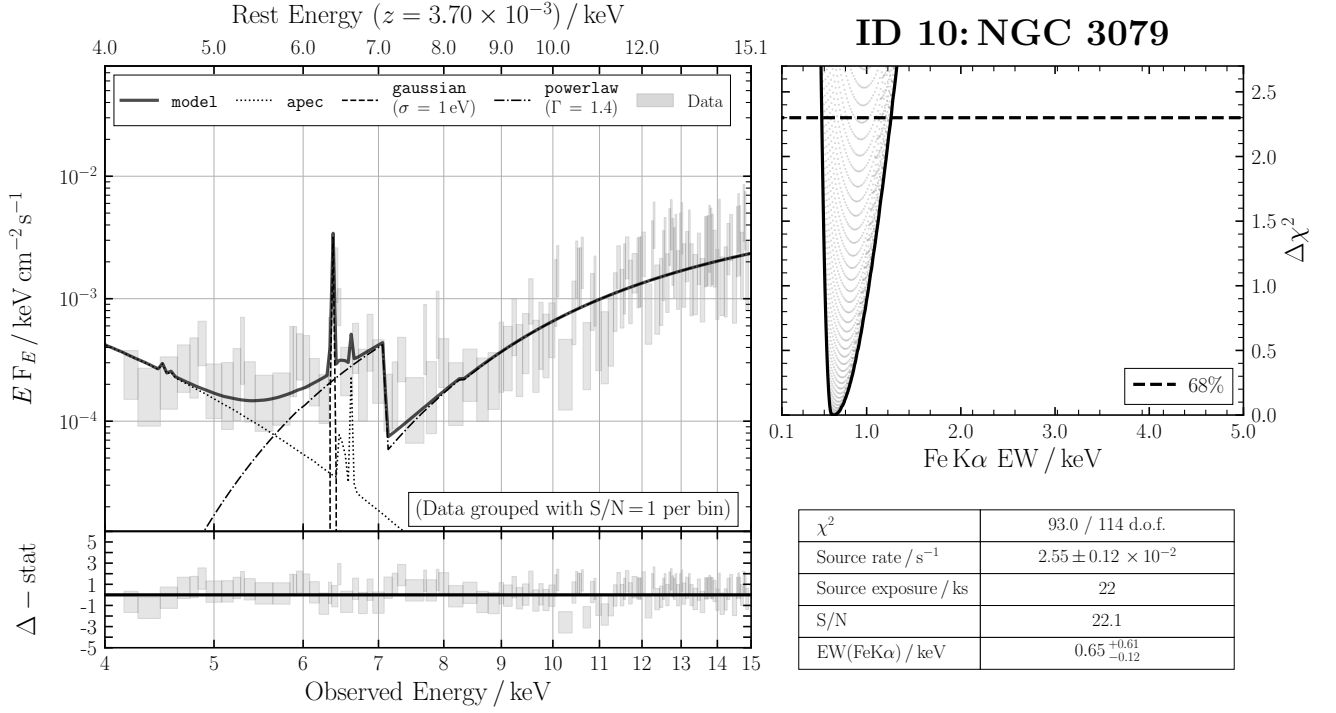
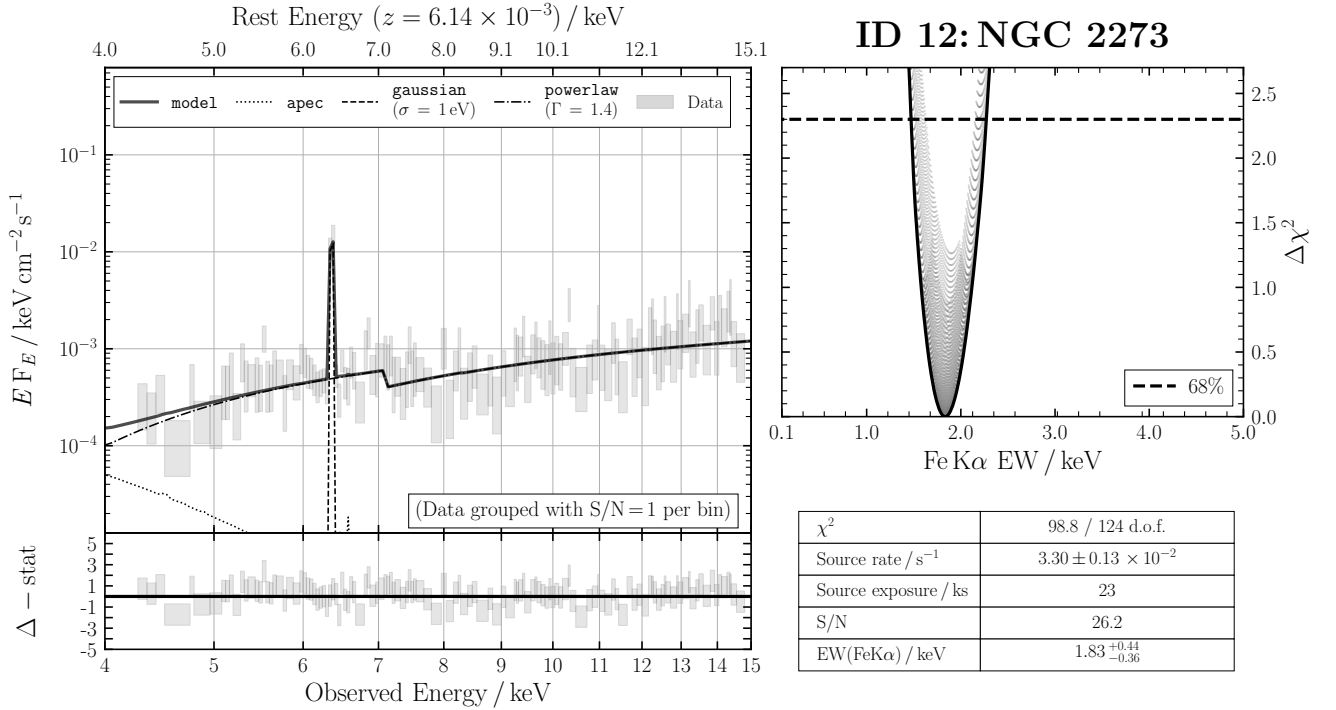


Figure B7. ID 7: NGC 4180

**Figure B8.** ID 8: ESO 137-G034**Figure B9.** ID 9: NGC 3393


Figure B10. ID 10: NGC 3079

Figure B11. ID 12: NGC 2273

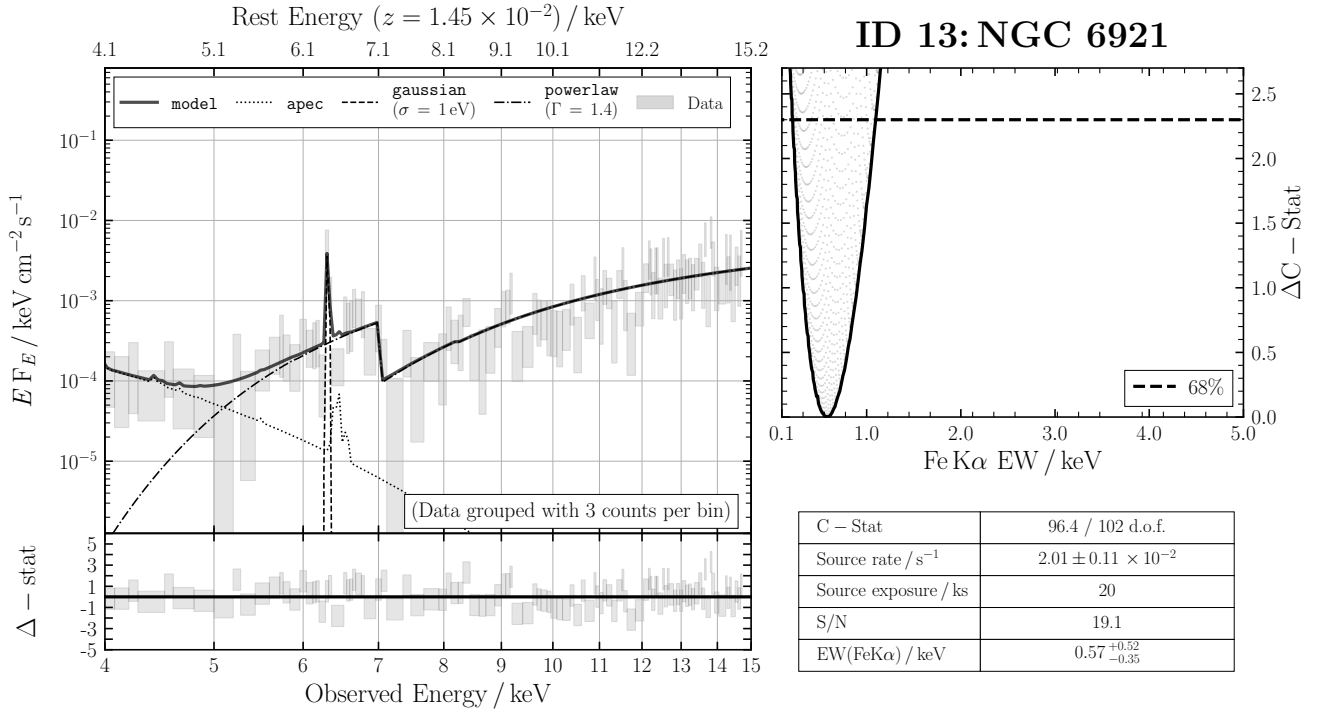


Figure B12. ID 13: NGC 6921

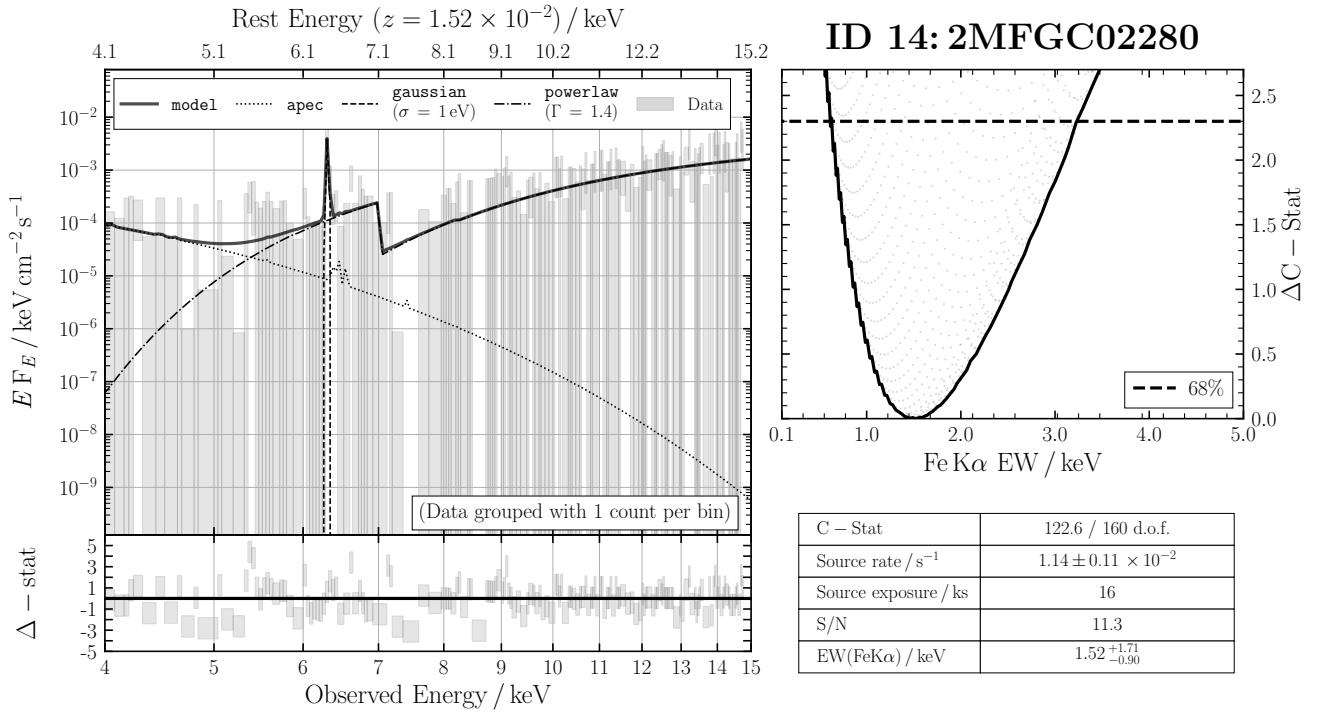


Figure B13. ID 14: 2MFGC02280

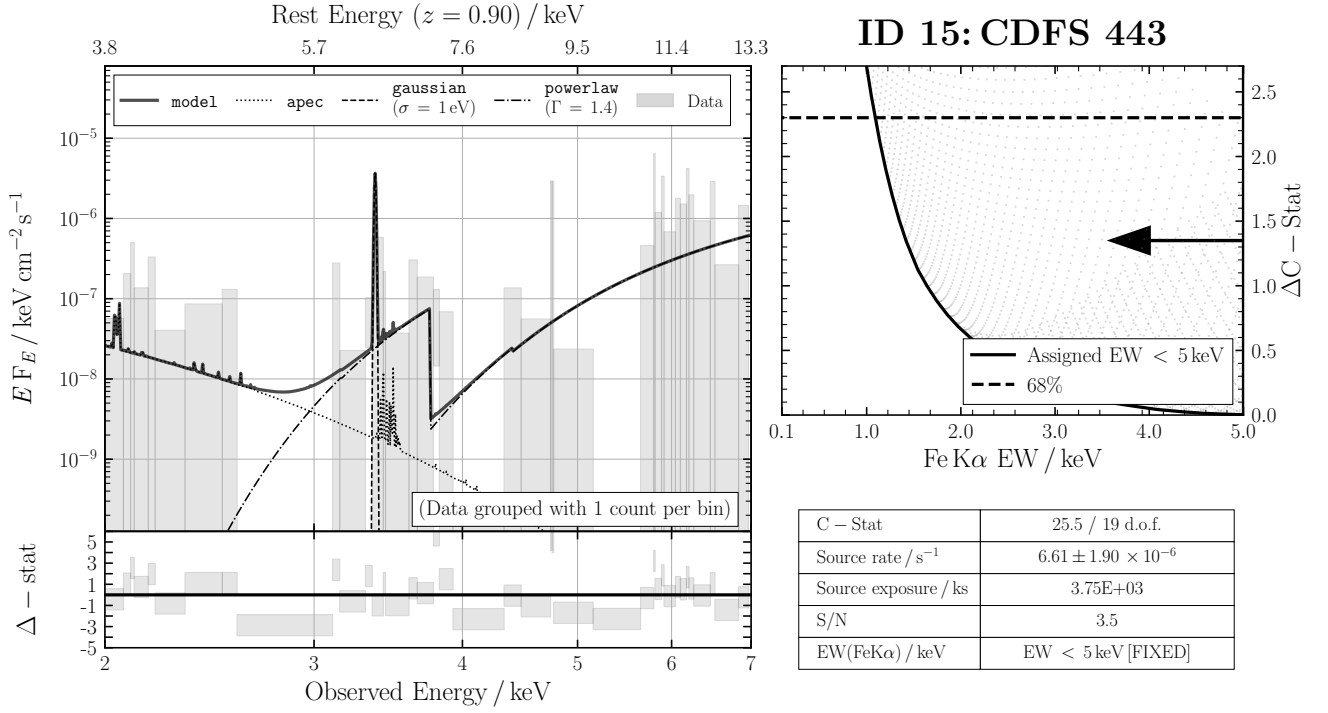


Figure B14. ID 15: CDFS 443

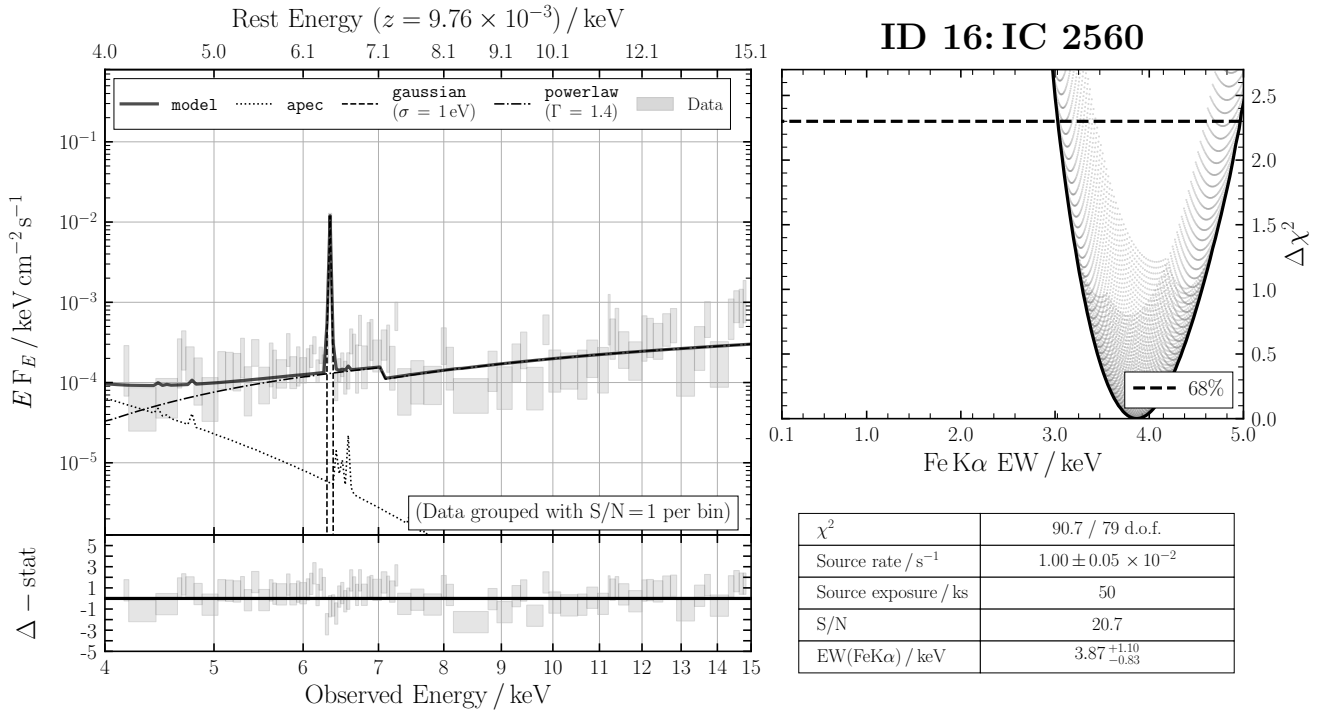
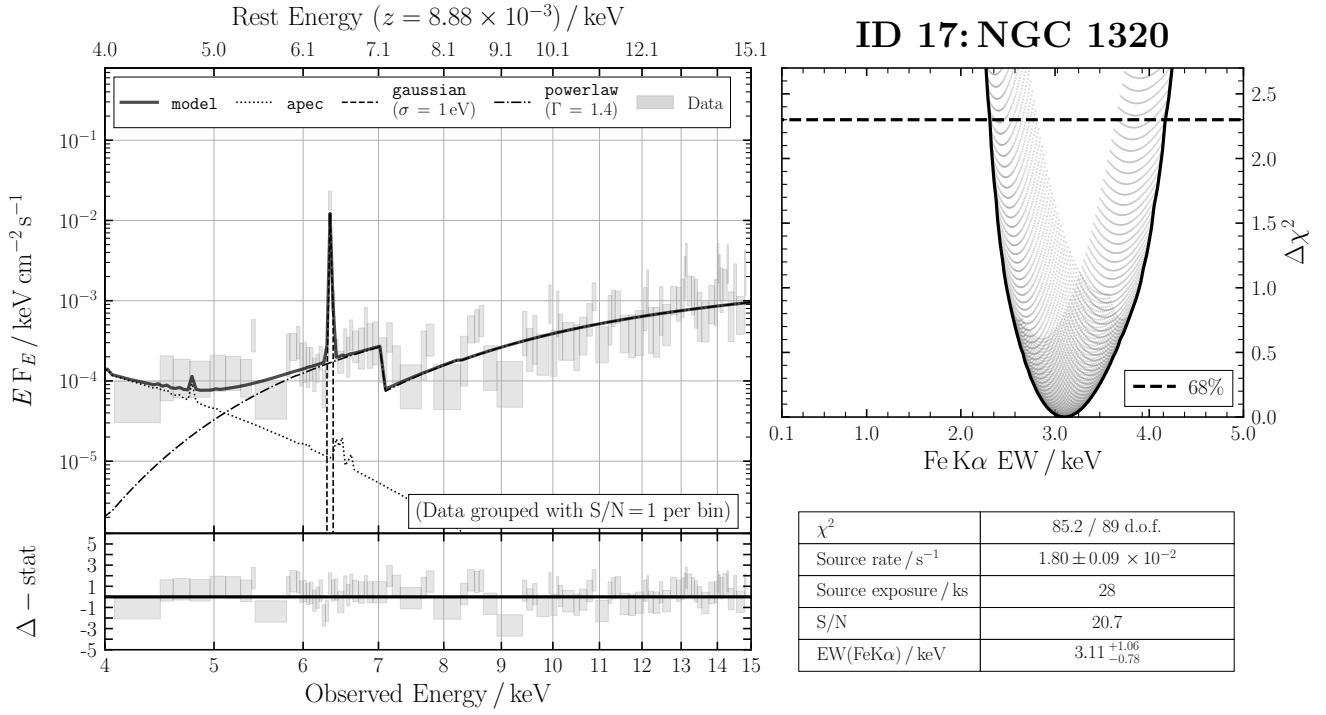
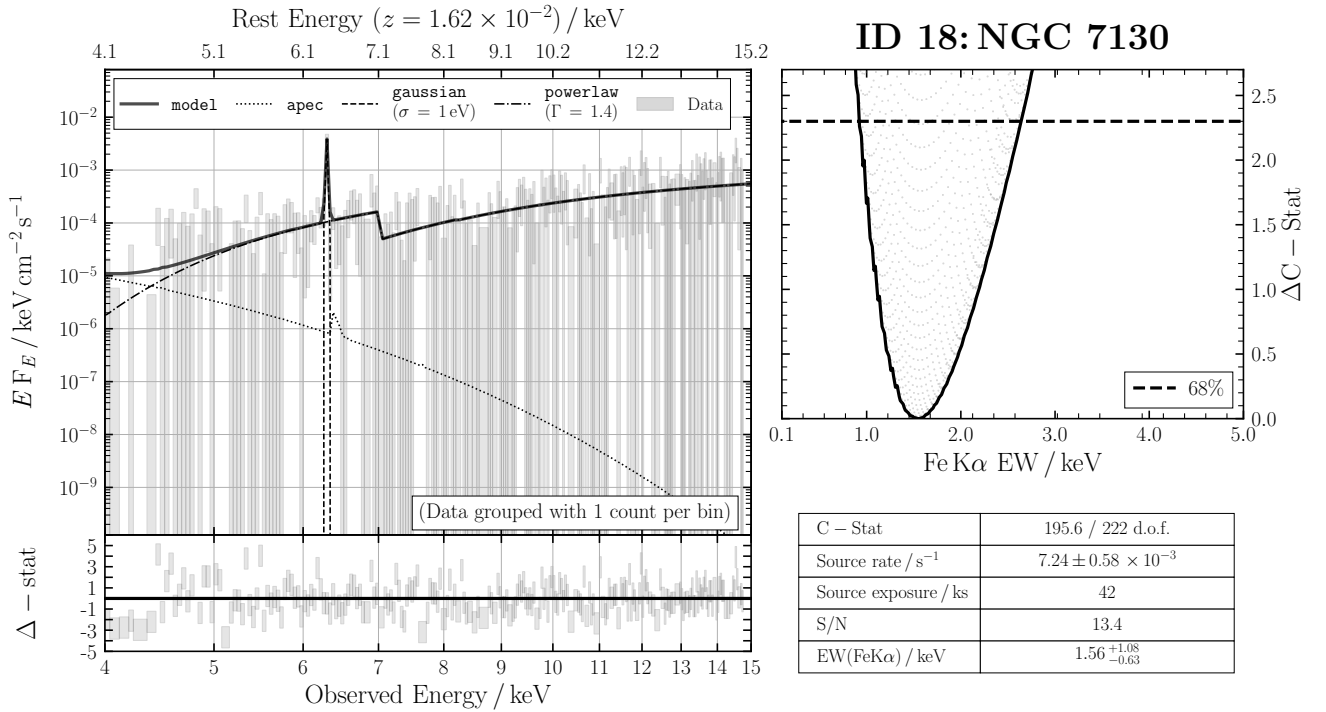


Figure B15. ID 16: IC 2560

**Figure B16.** ID 17: NGC 1320**Figure B17.** ID 18: NGC 7130

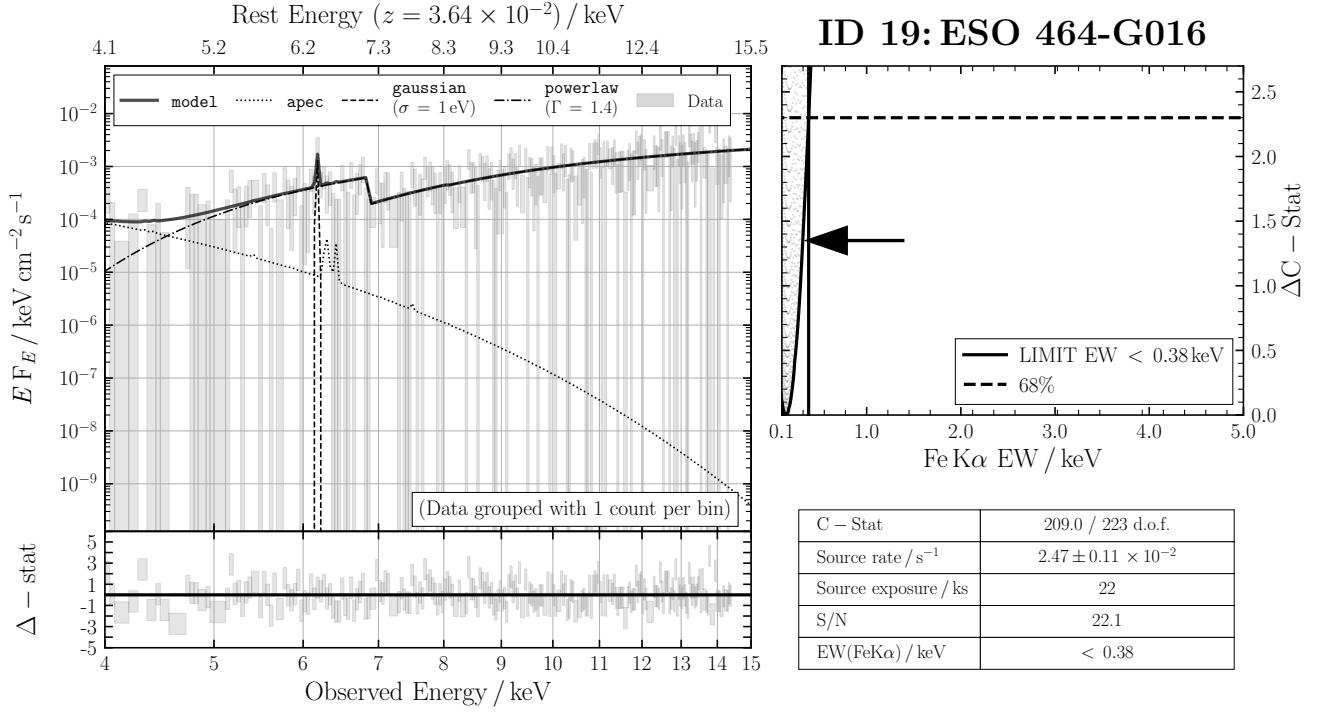


Figure B18. ID 19: ESO 464-G016

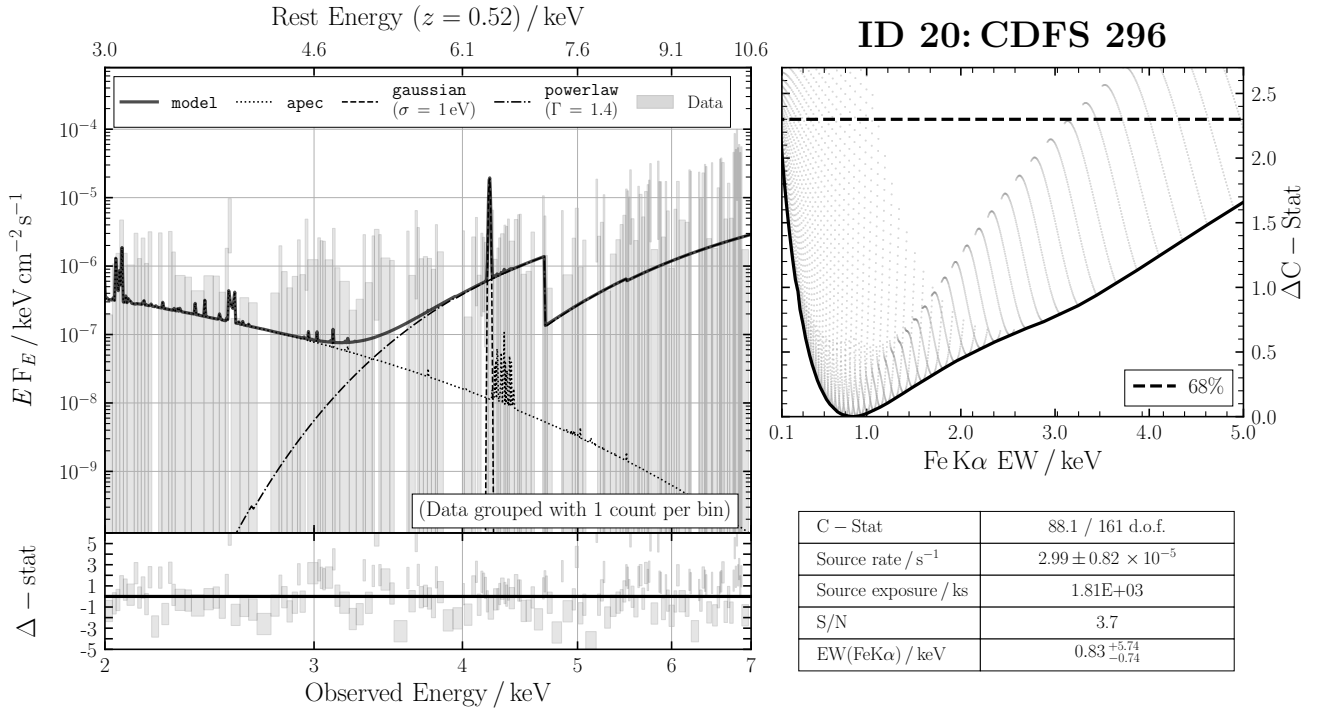


Figure B19. ID 20: CDFS 296

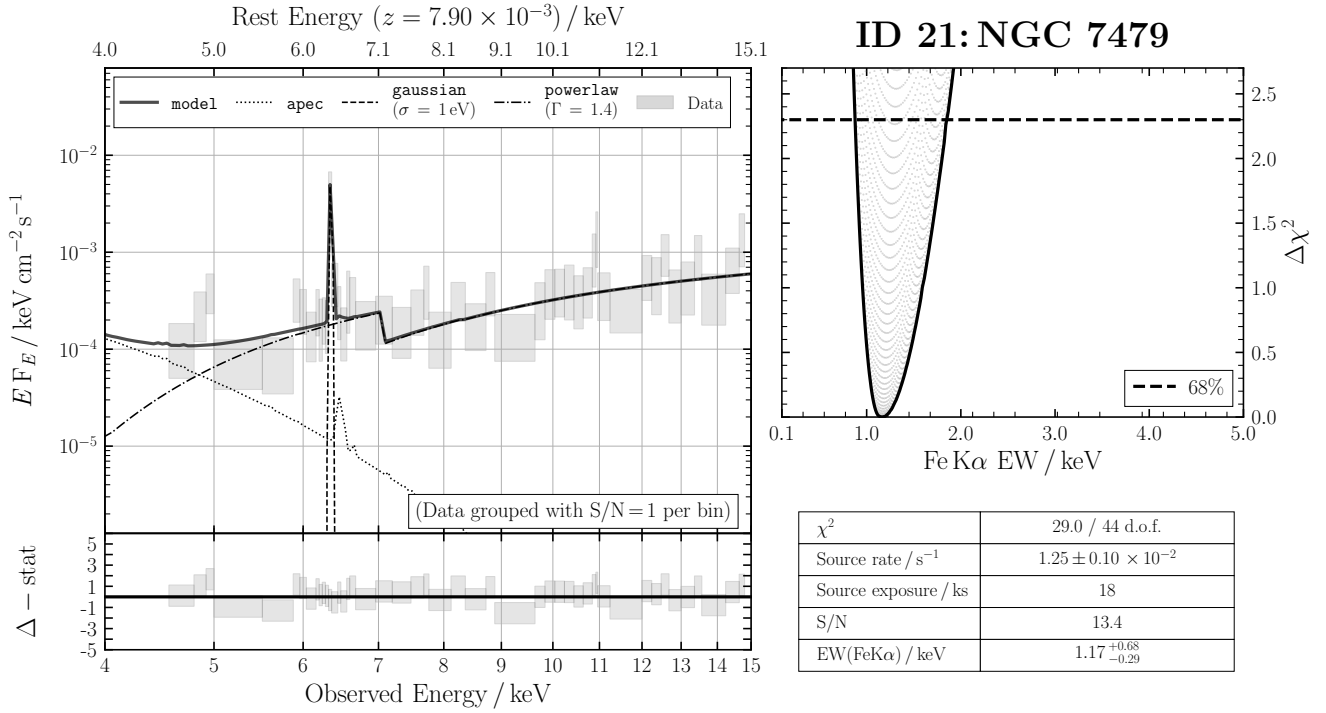


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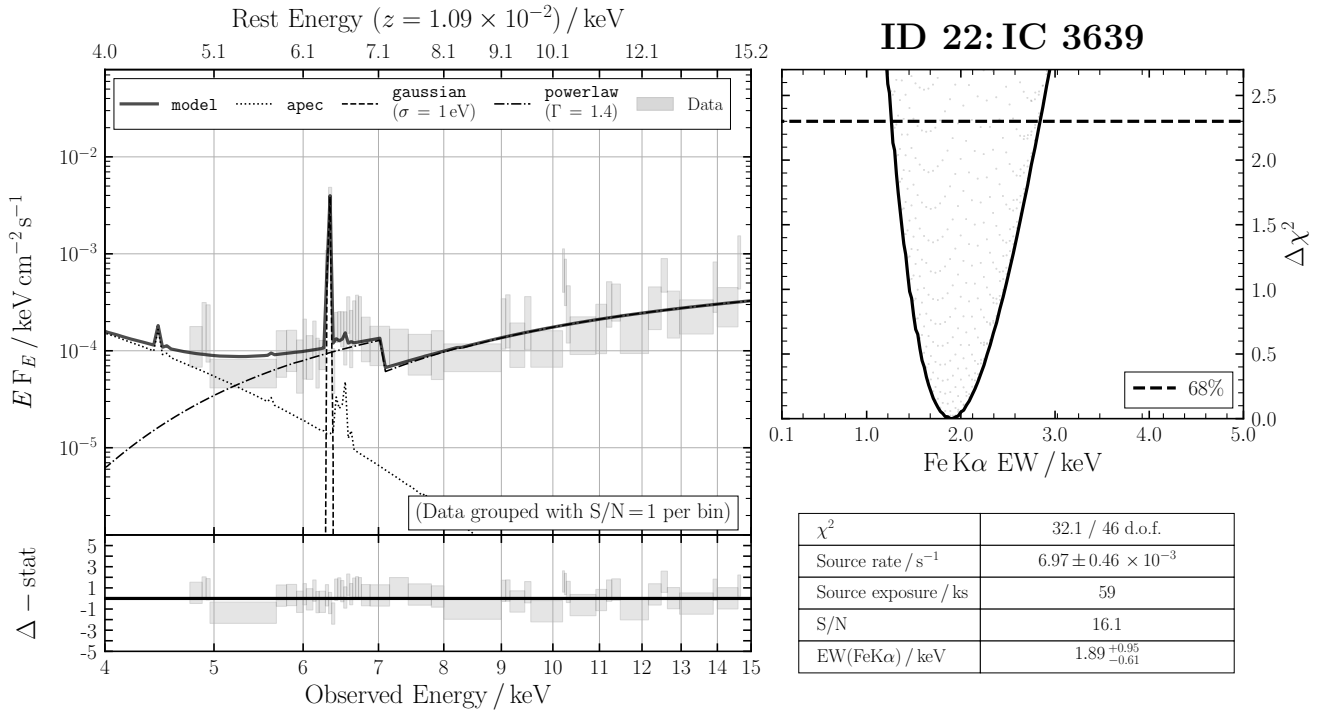


Figure B21. ID 22: IC 3639

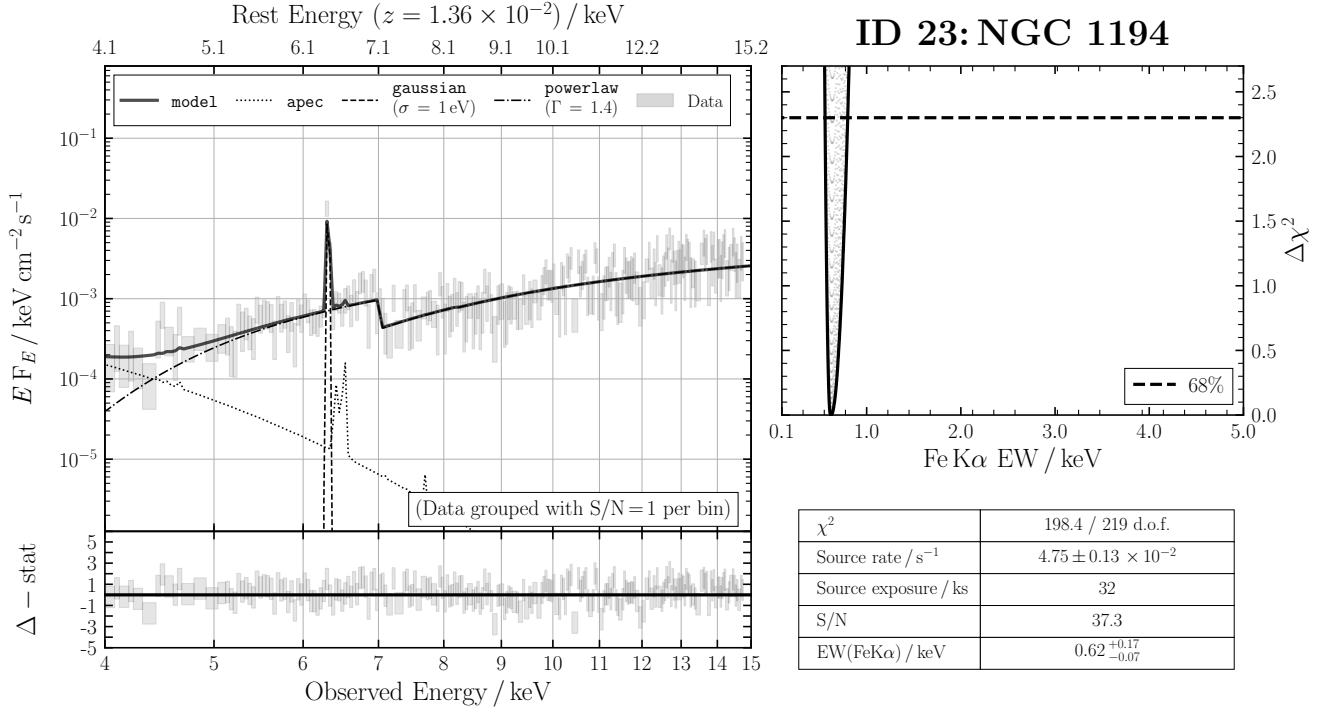


Figure B22. ID 23: NGC 1194

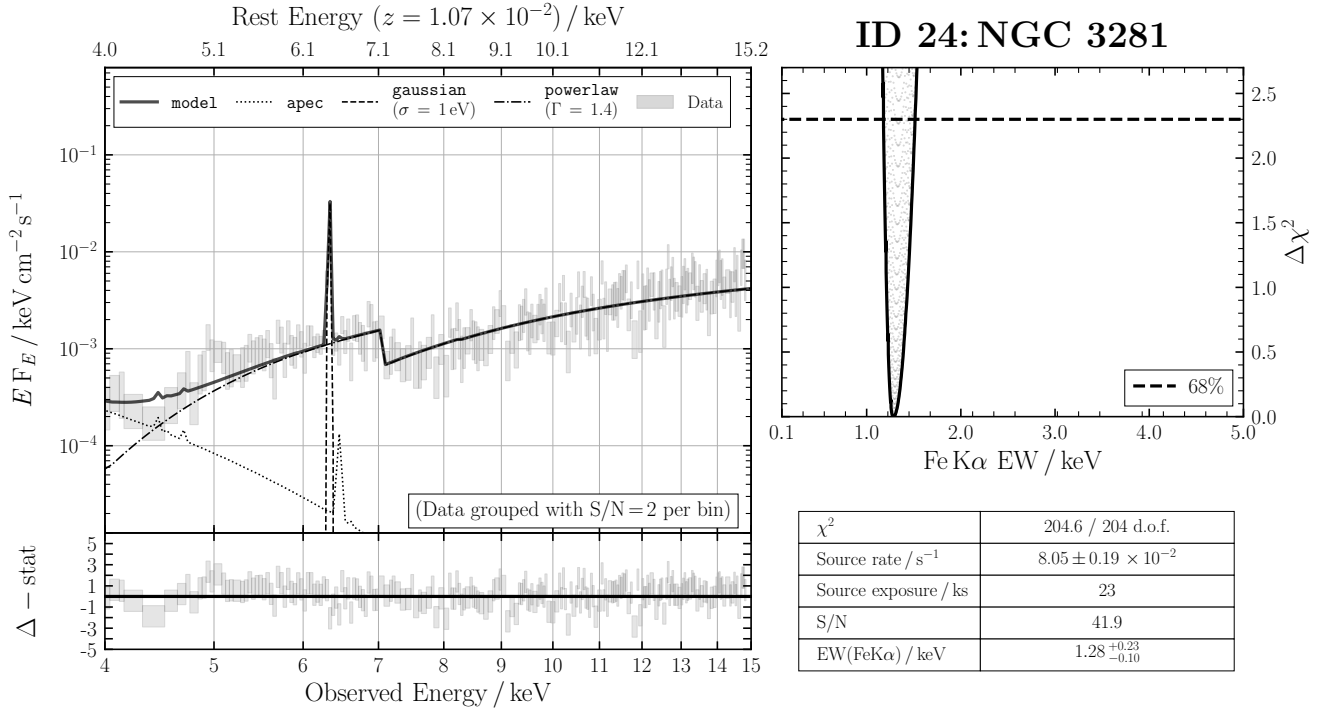


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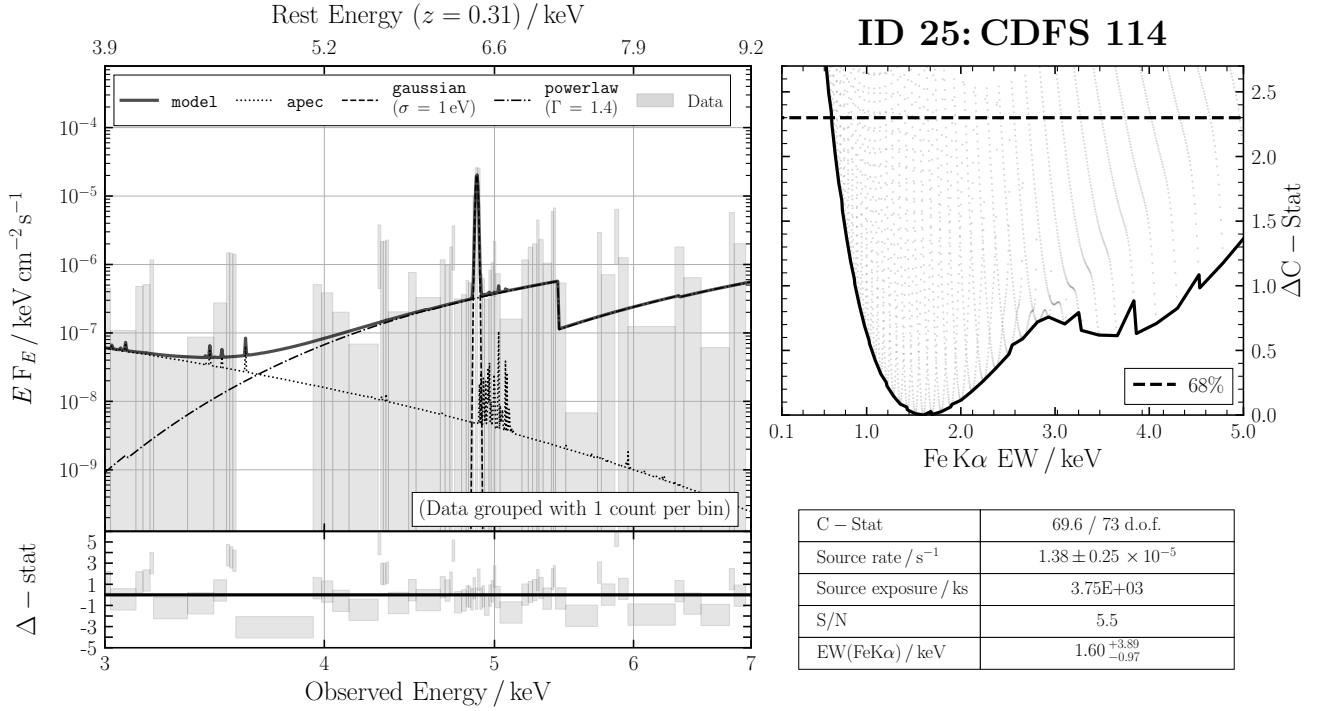


Figure B24. ID 25: CDFS 114

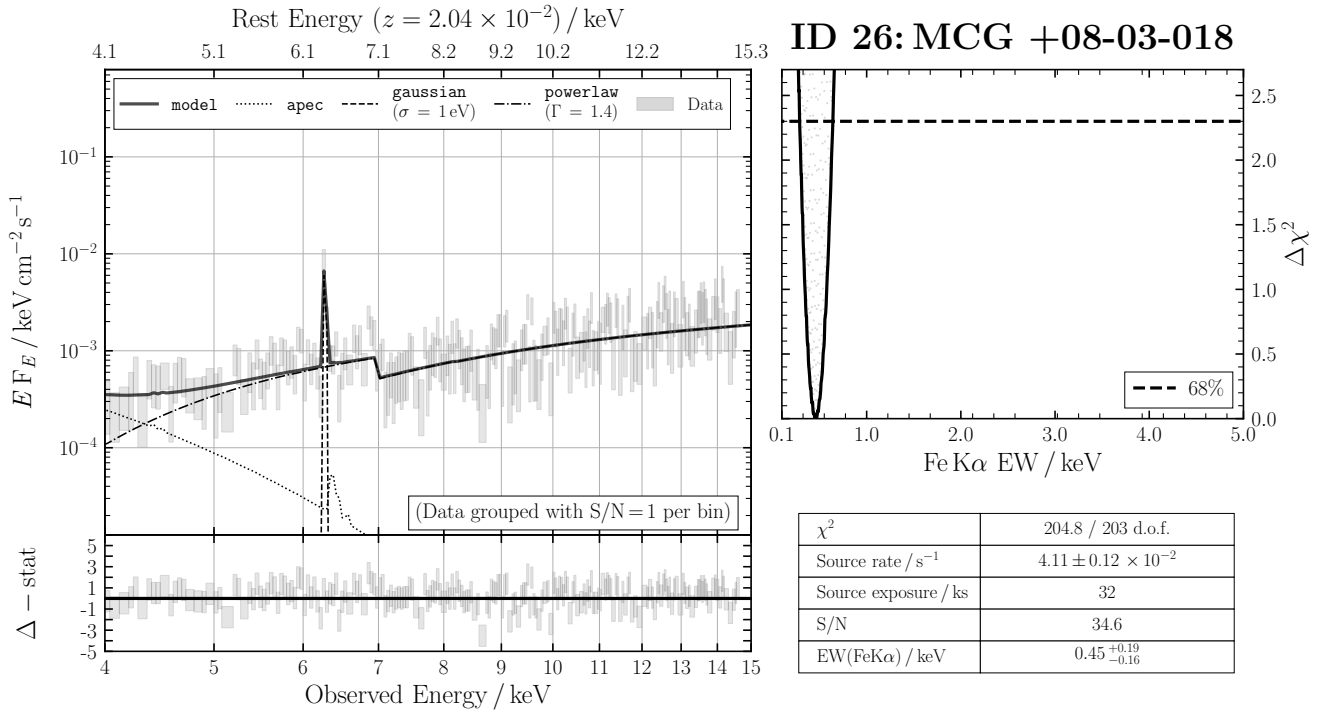


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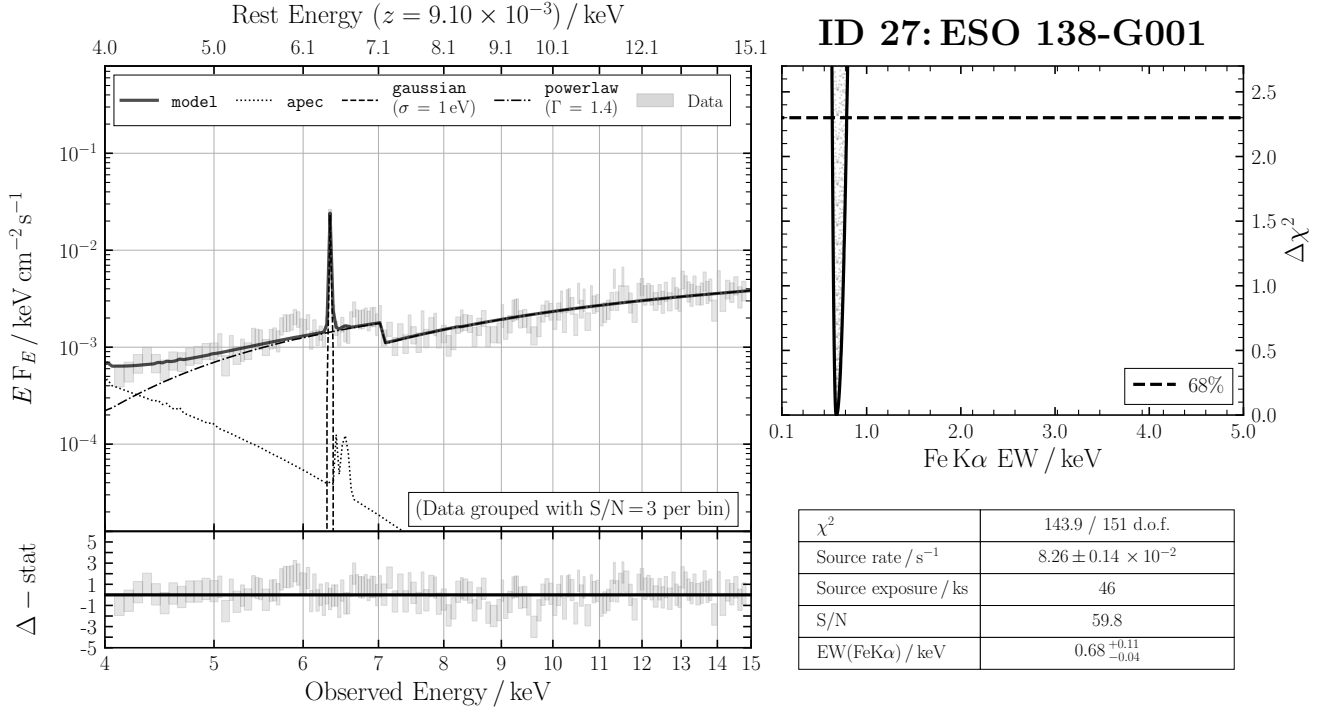


Figure B26. ID 27: ESO 138-G001

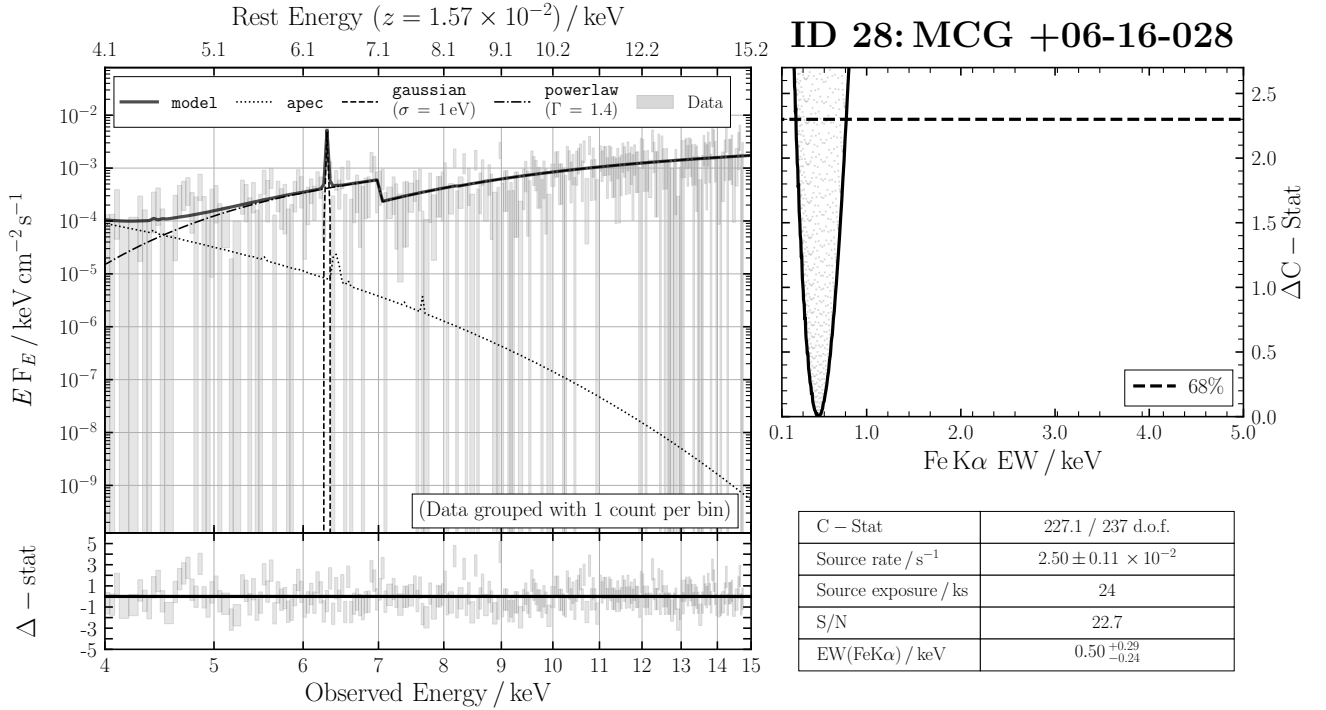


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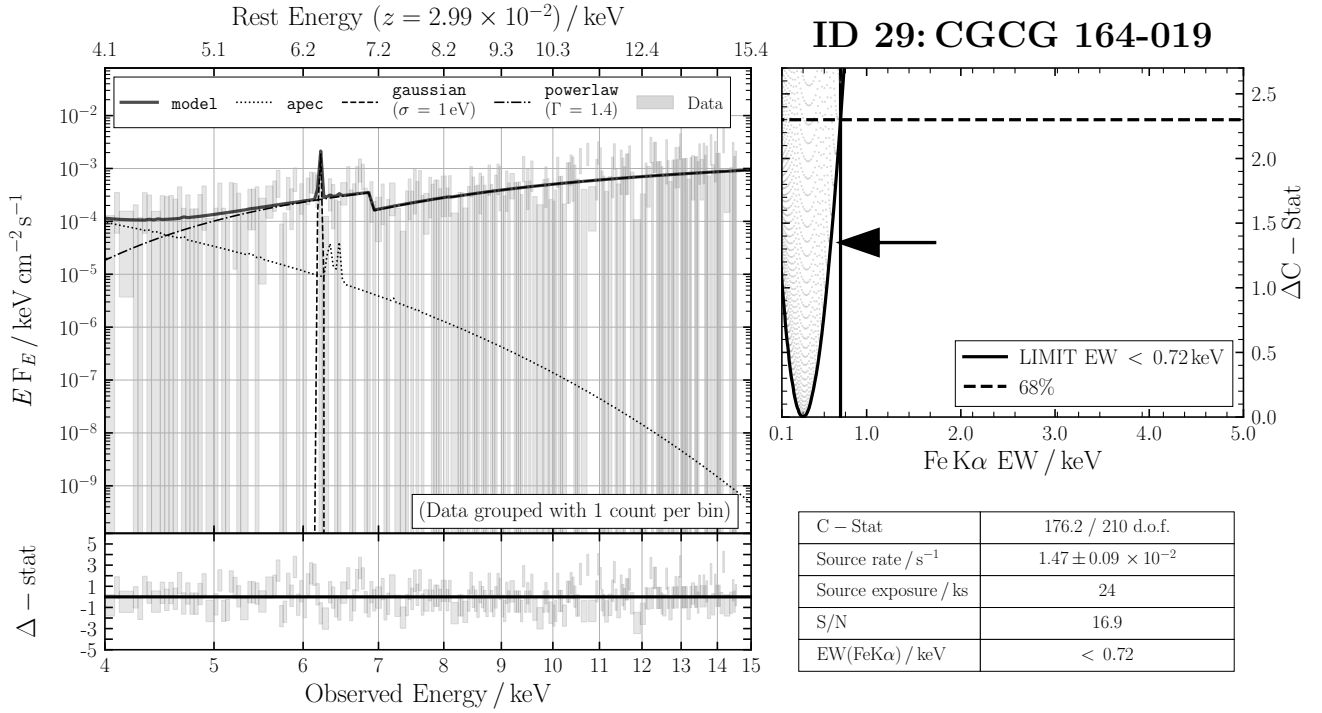


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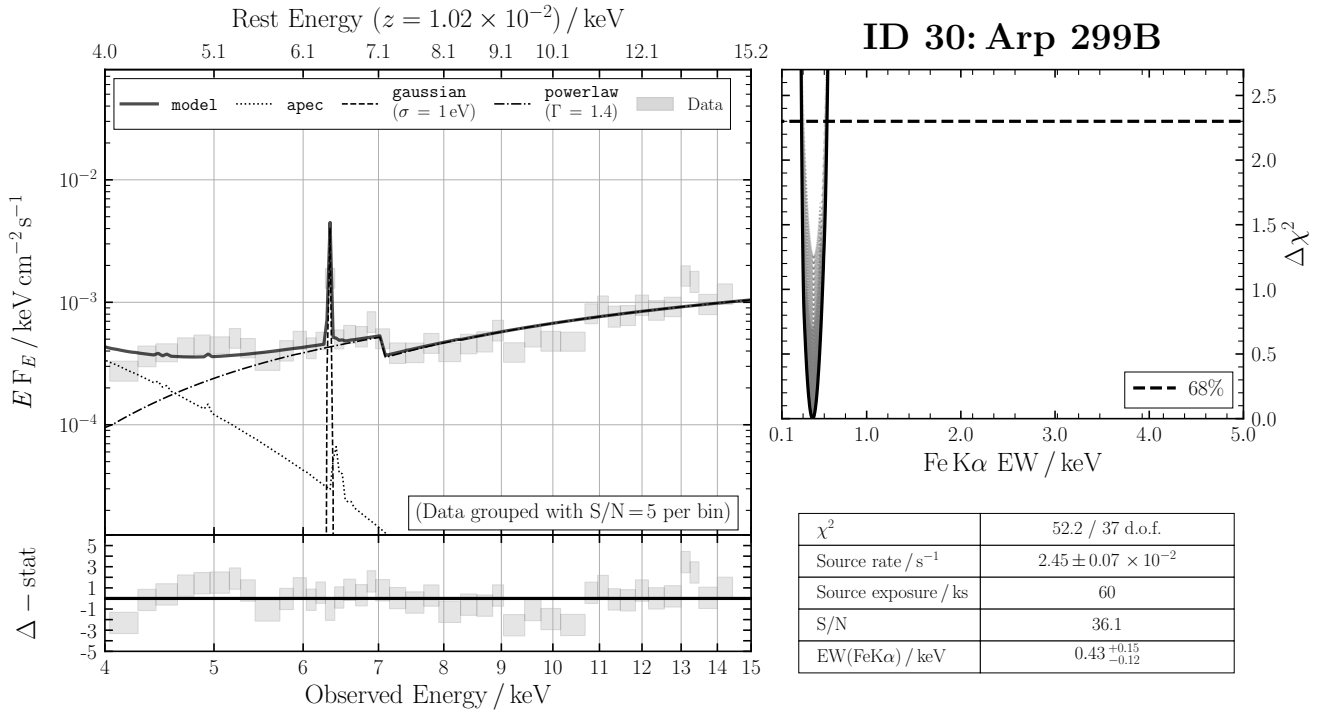
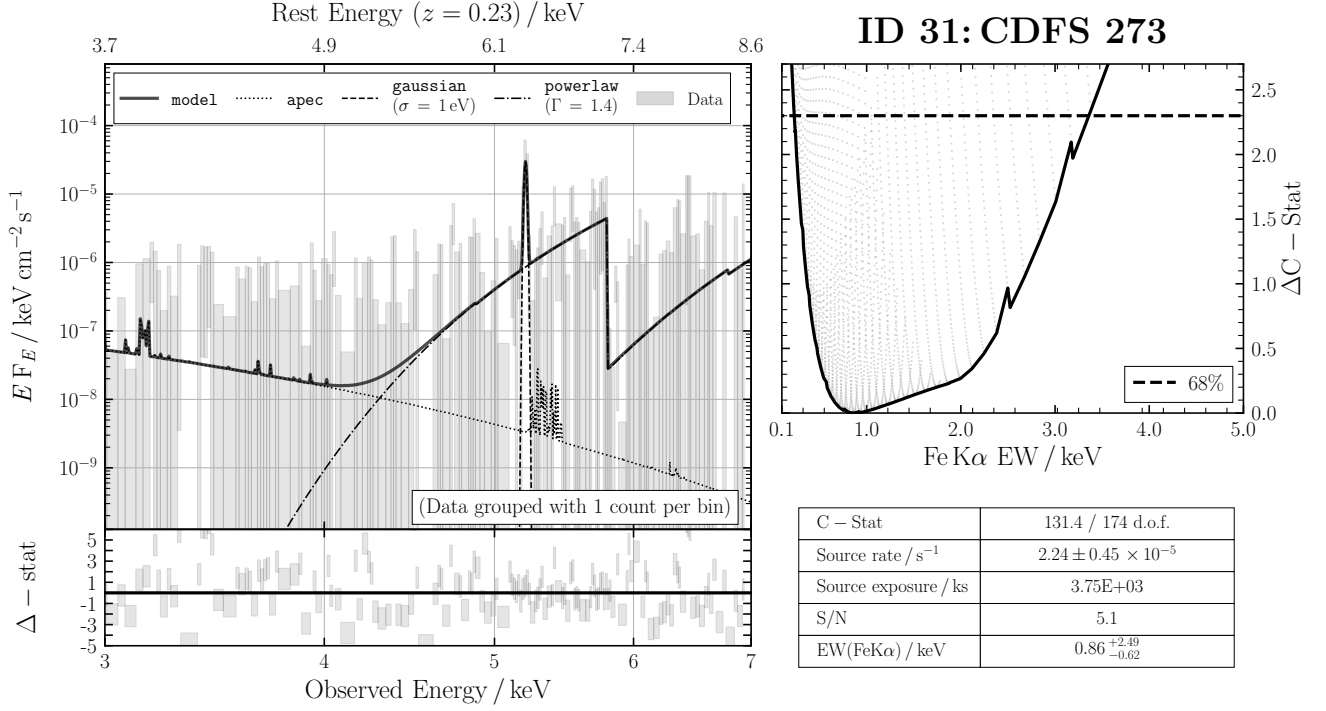
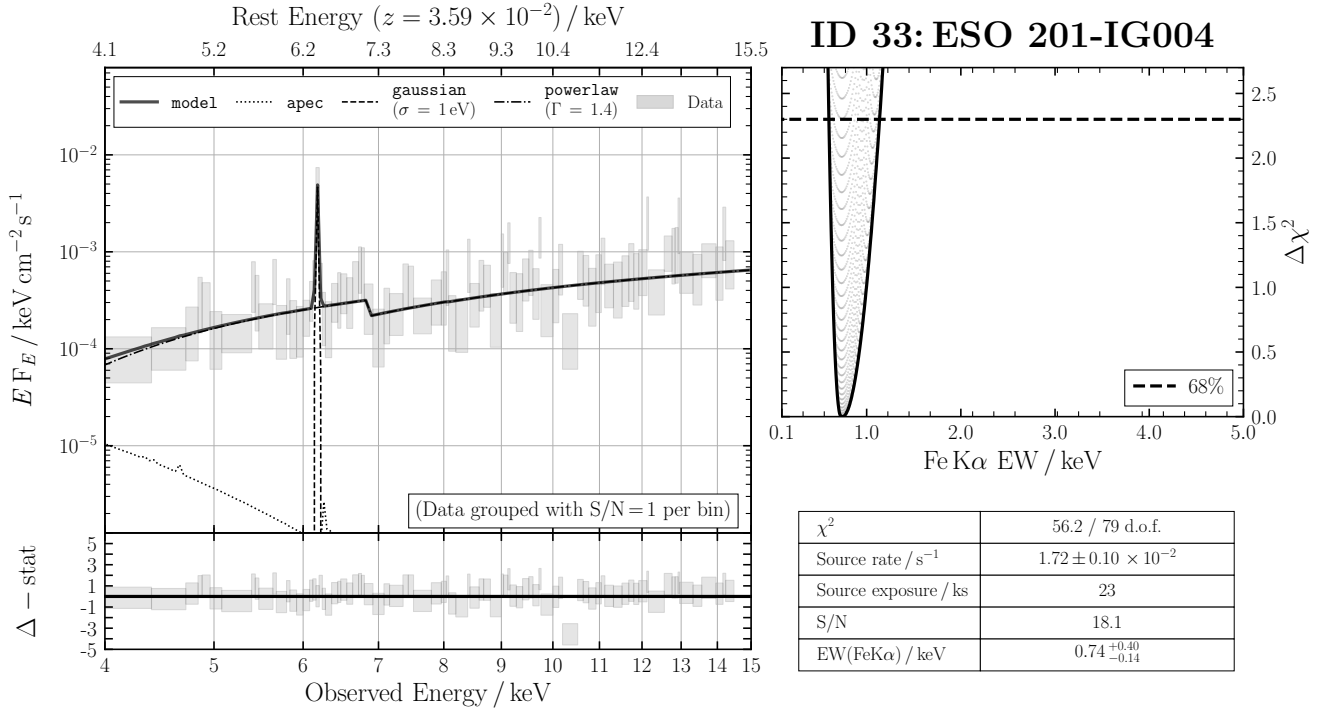


Figure B29. ID 30: Arp 299B


Figure B30. ID 31: CDFS 273

Figure B31. ID 33: ESO 201-IG004

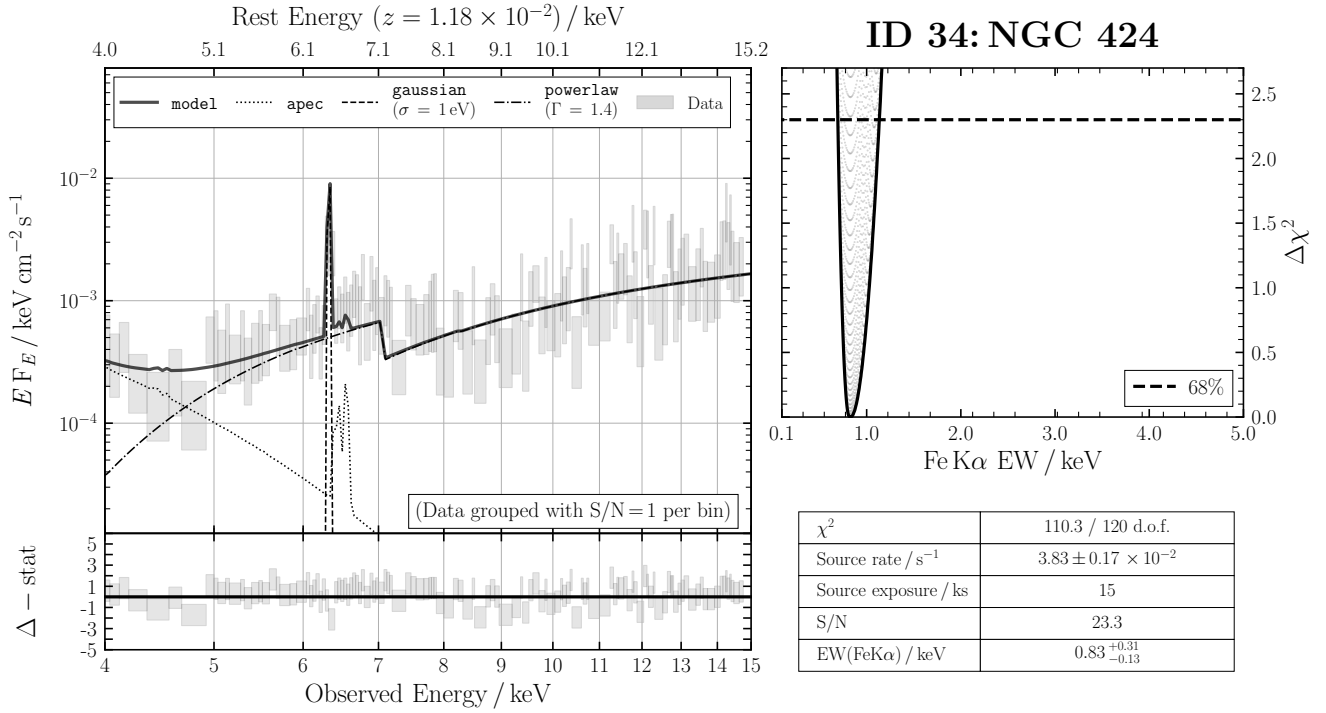


Figure B32. ID 34: NGC 424

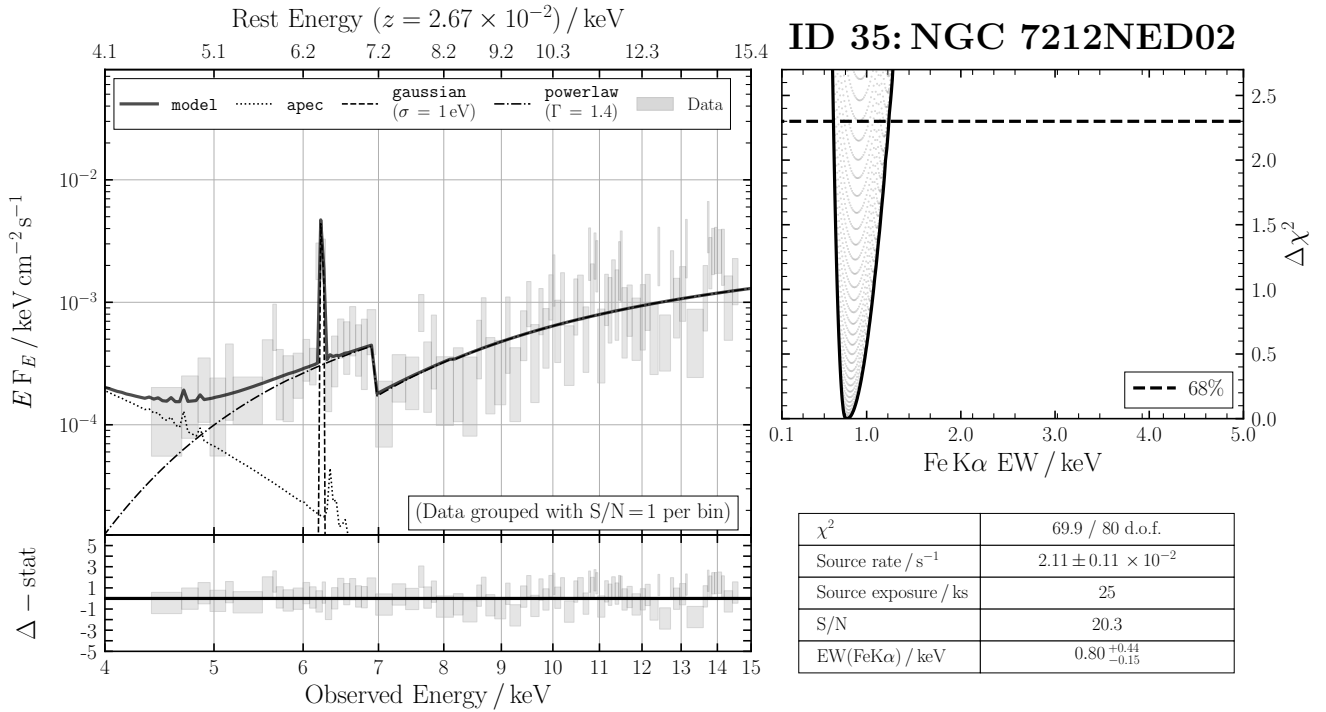


Figure B33. ID 35: NGC 7212NED02

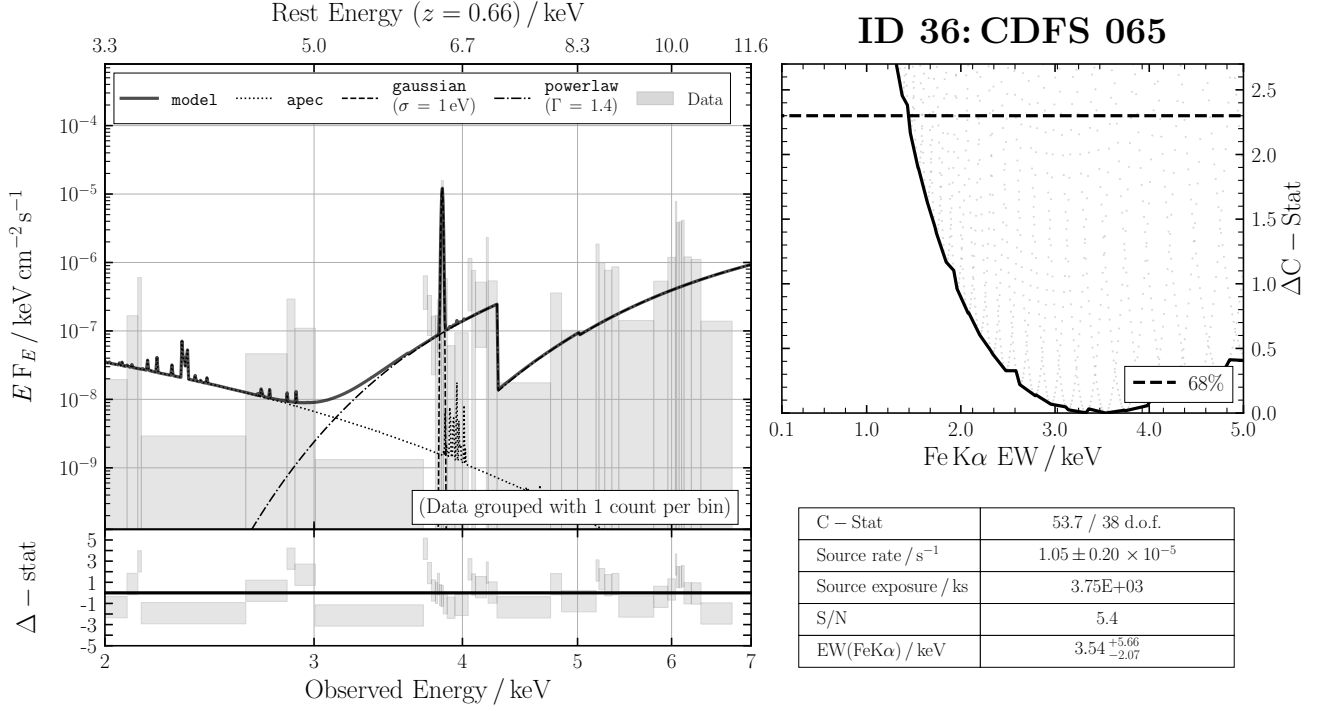


Figure B34. ID 36: CDFS 065

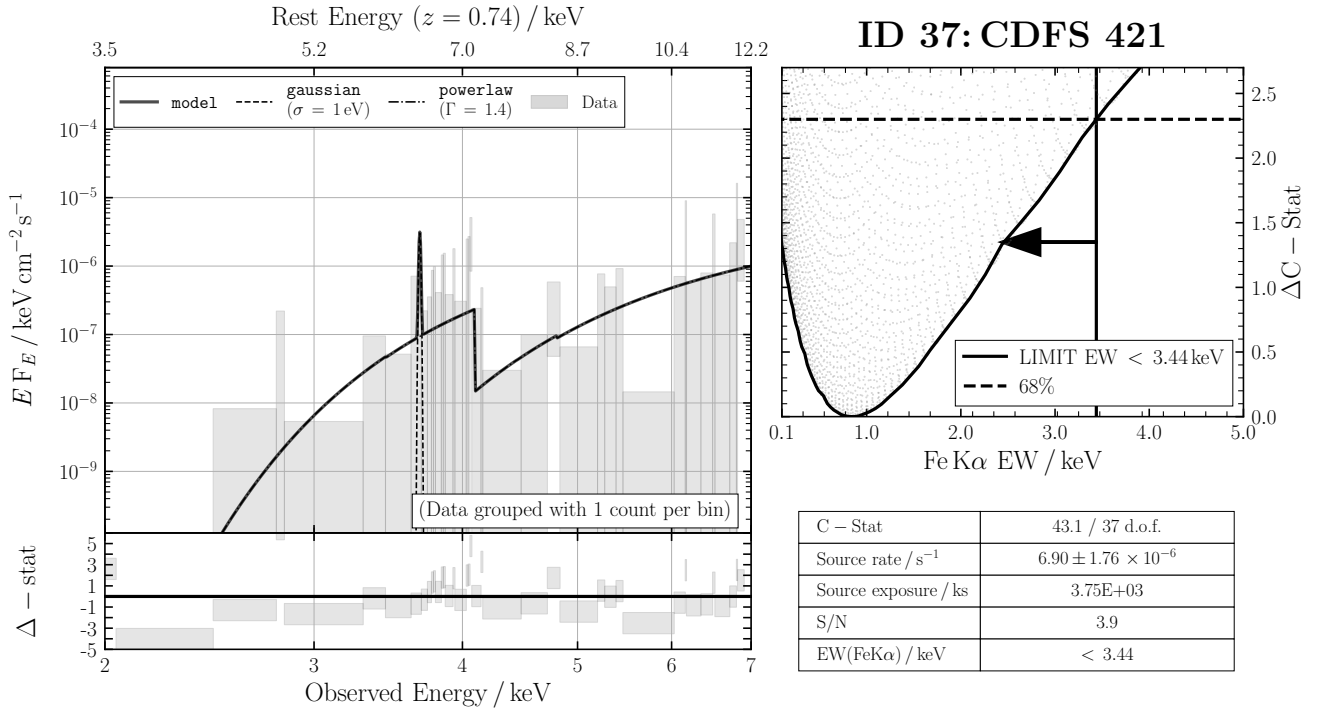
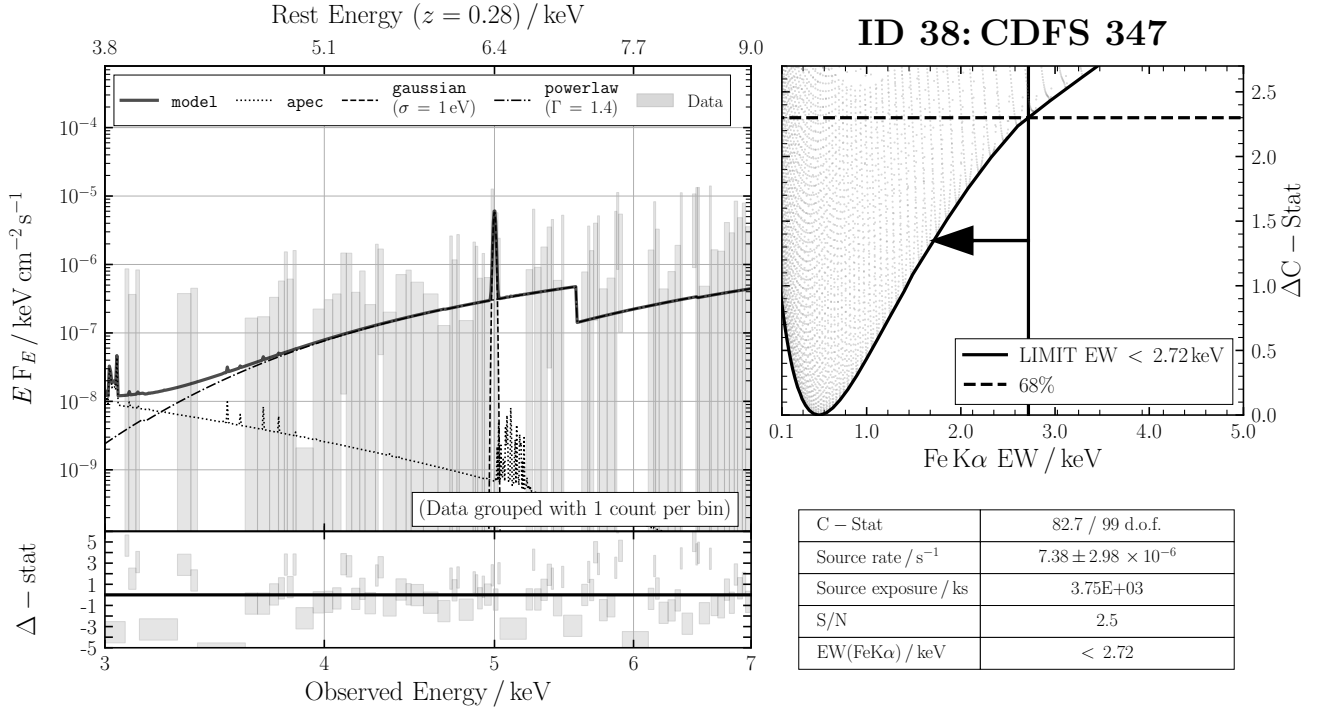
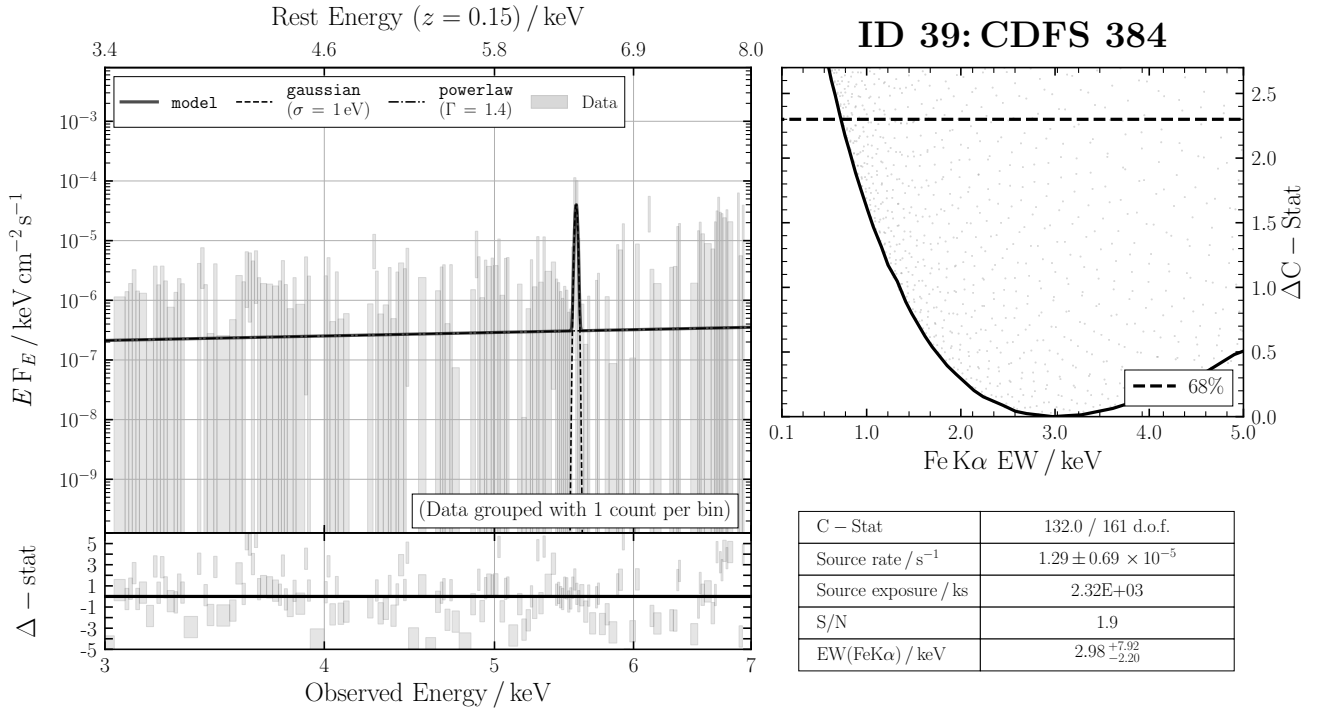
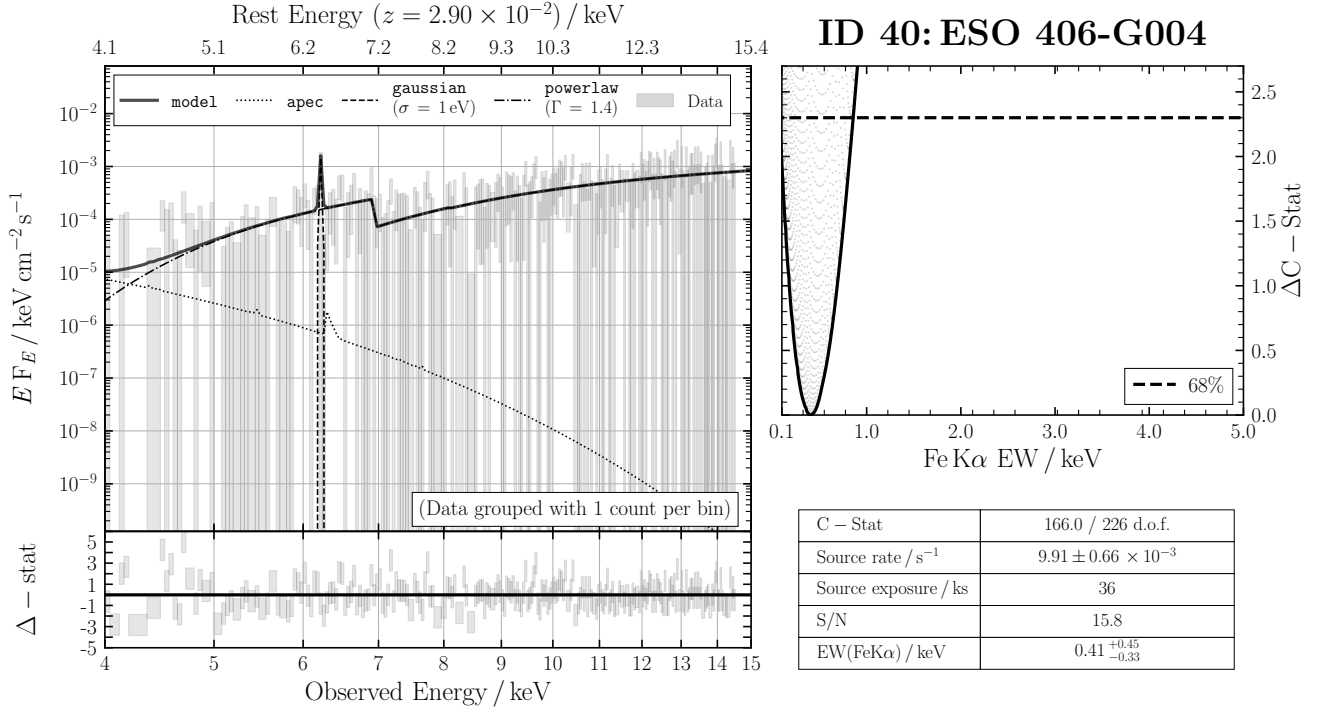
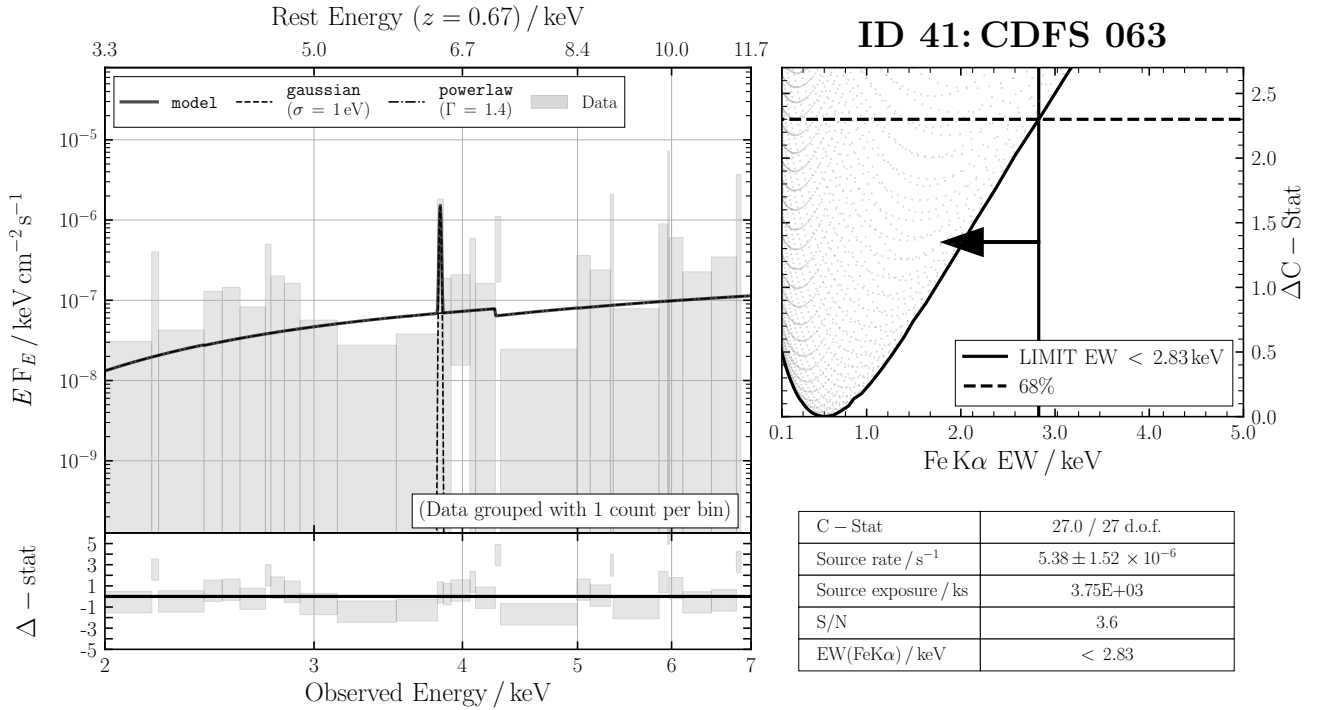


Figure B35. ID 37: CDFS 421


Figure B36. ID 38: CDFS 347

Figure B37. ID 39: CDFS 384


Figure B38. ID 40: ESO 406-G004

Figure B39. ID 41: CDFS 063

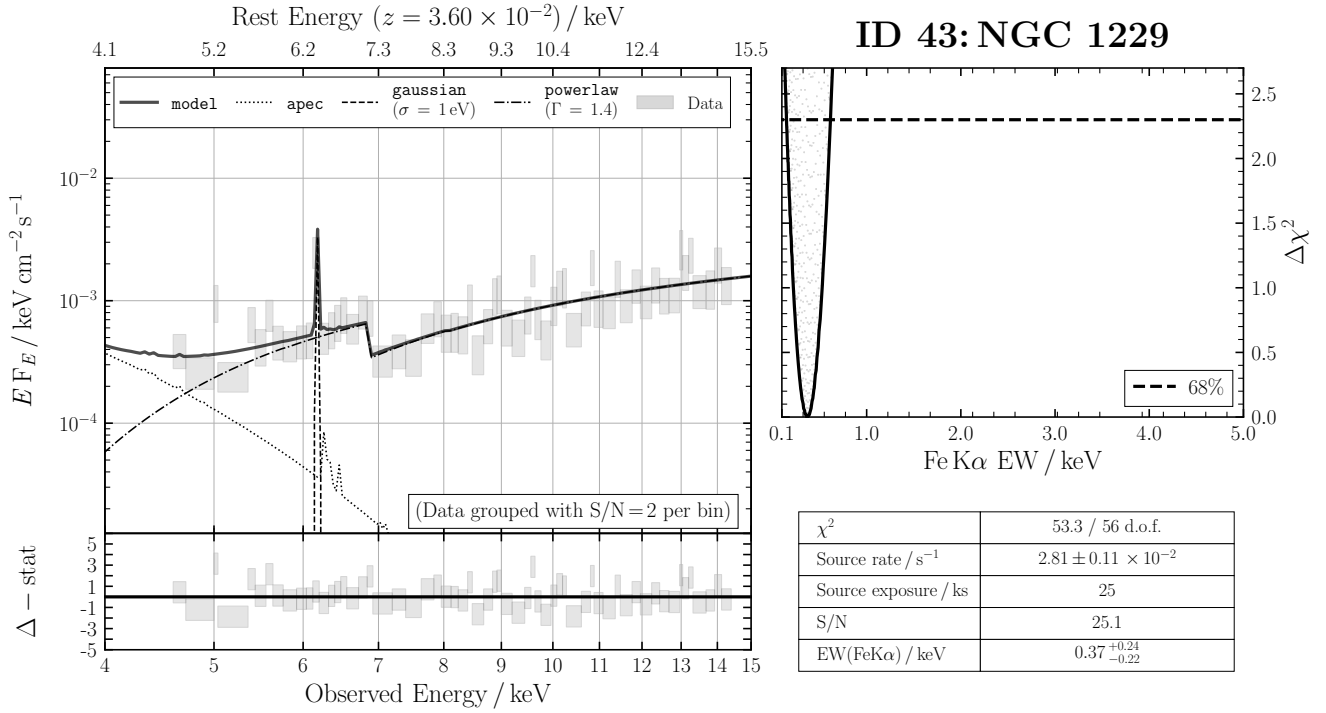


Figure B40. ID 43: NGC 1229

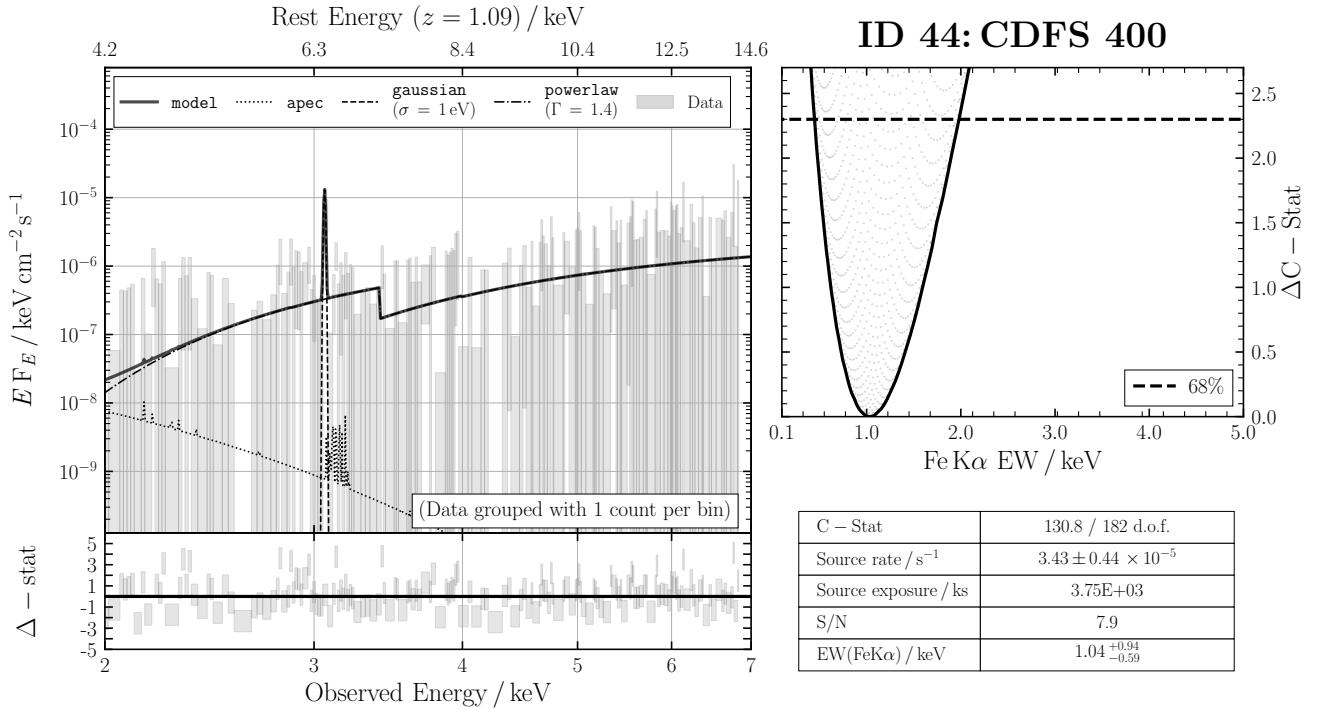
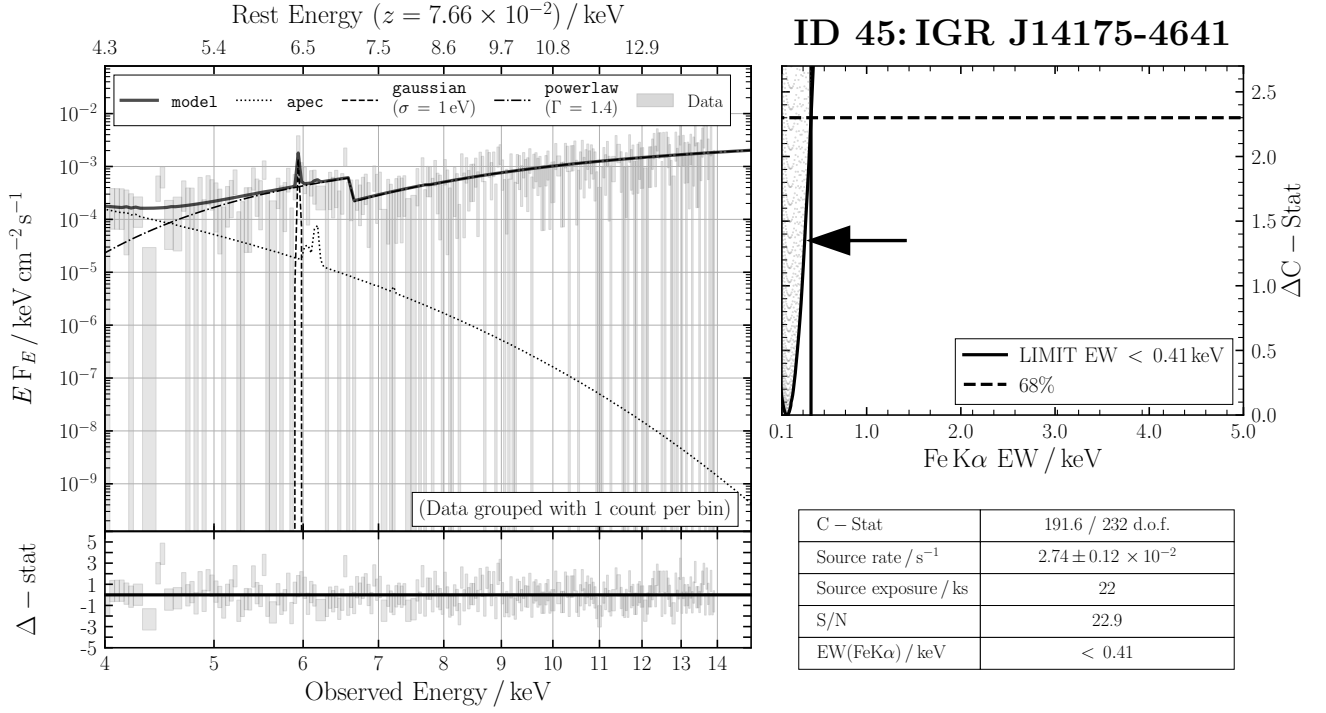
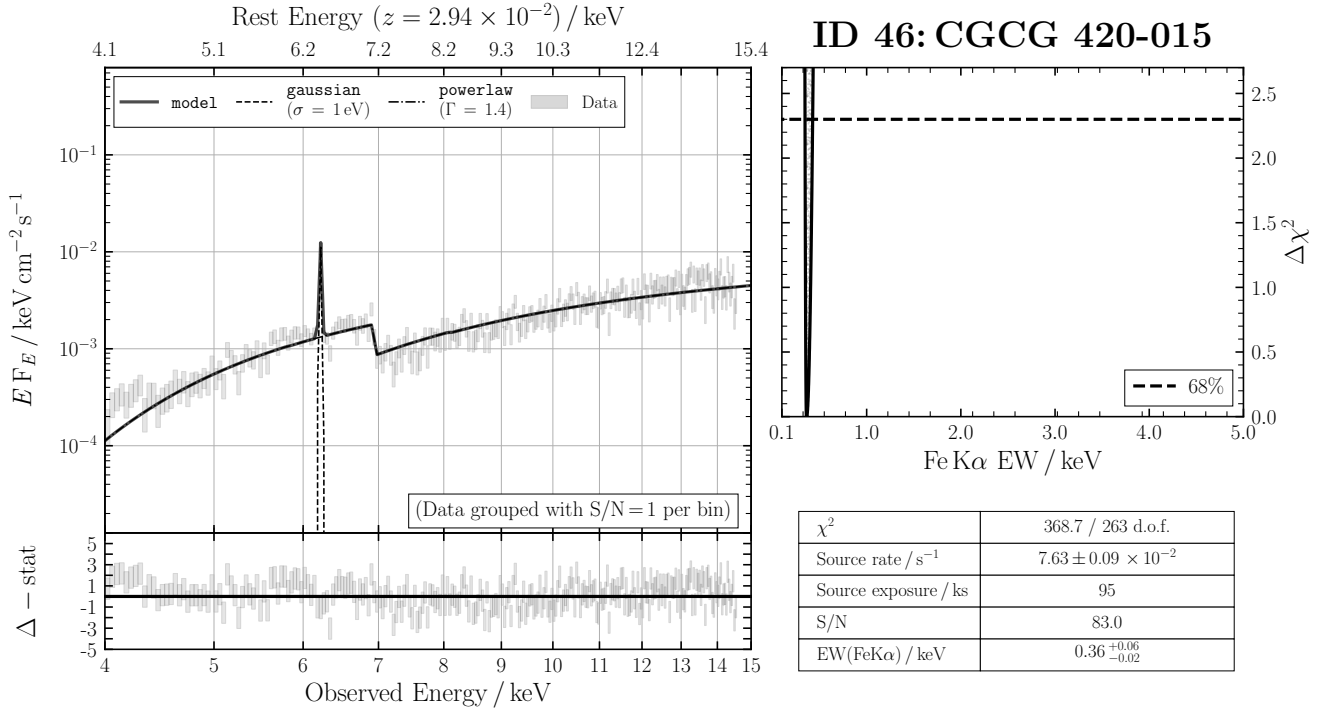


Figure B41. ID 44: CDFS 400


Figure B42. ID 45: IGR J14175-4641

Figure B43. ID 46: CGCG 420-015

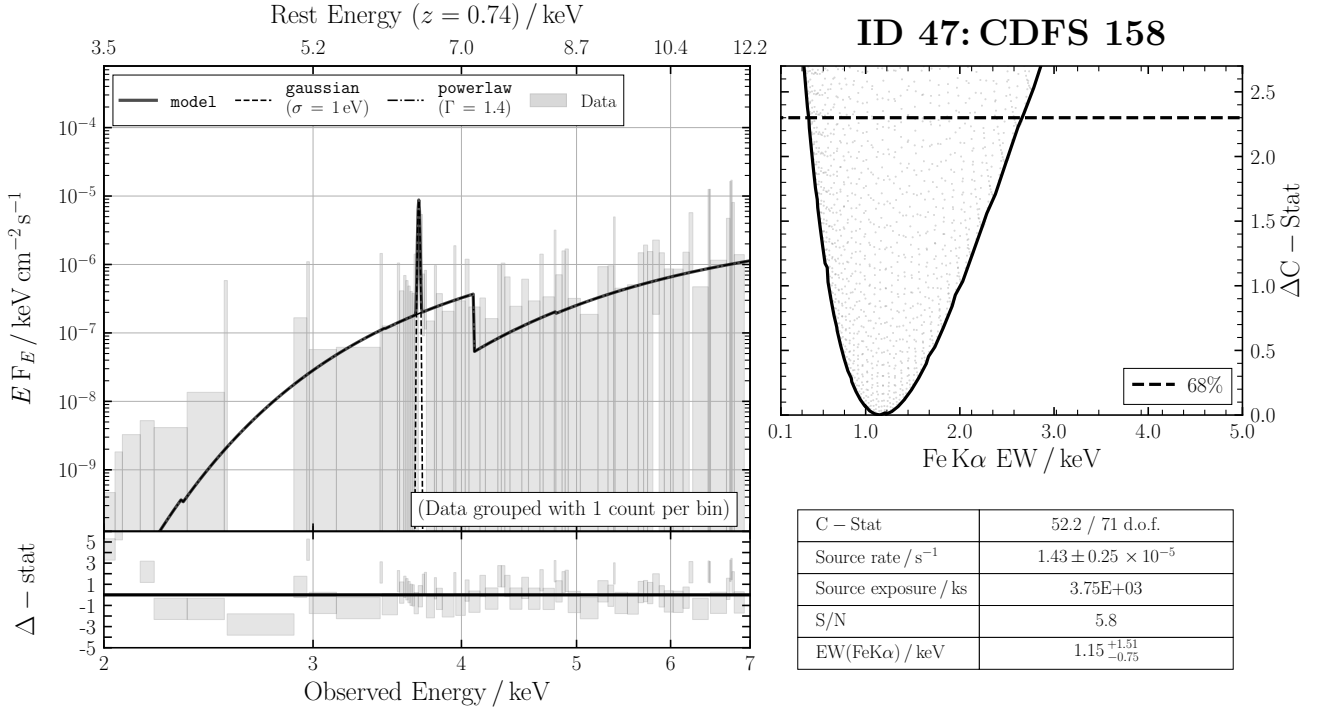


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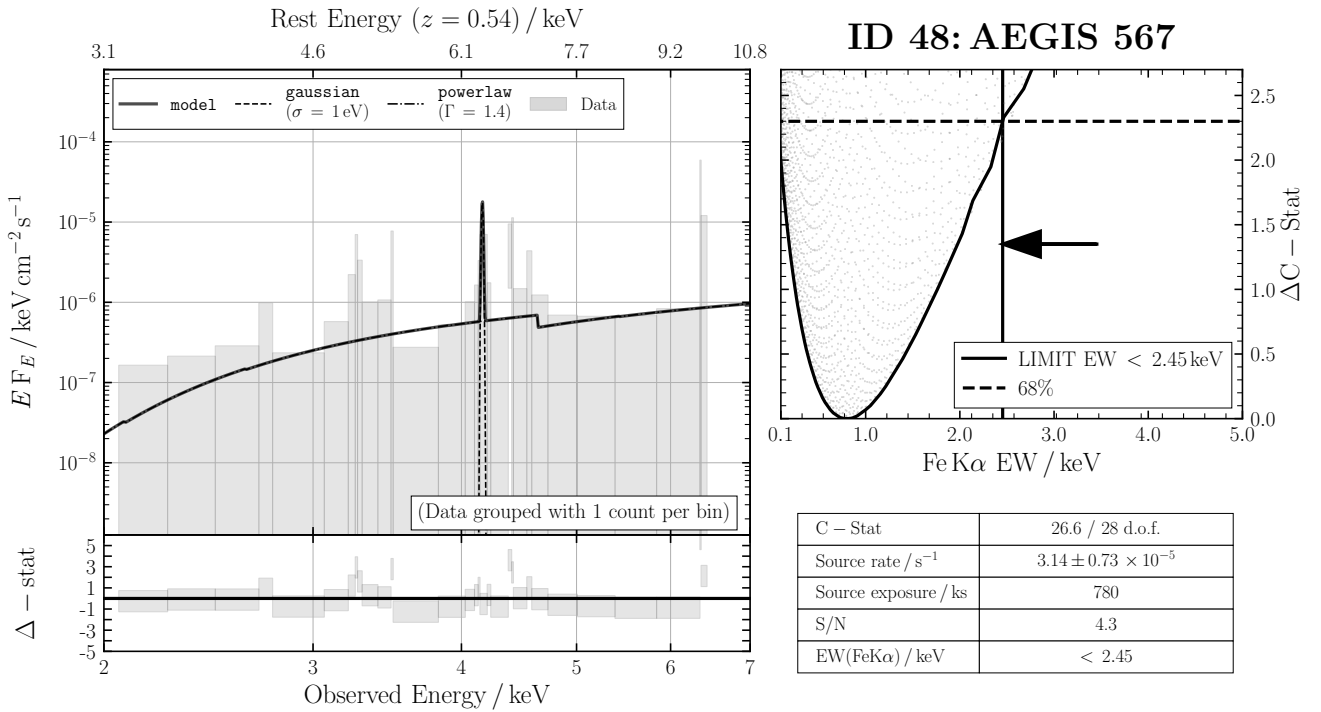


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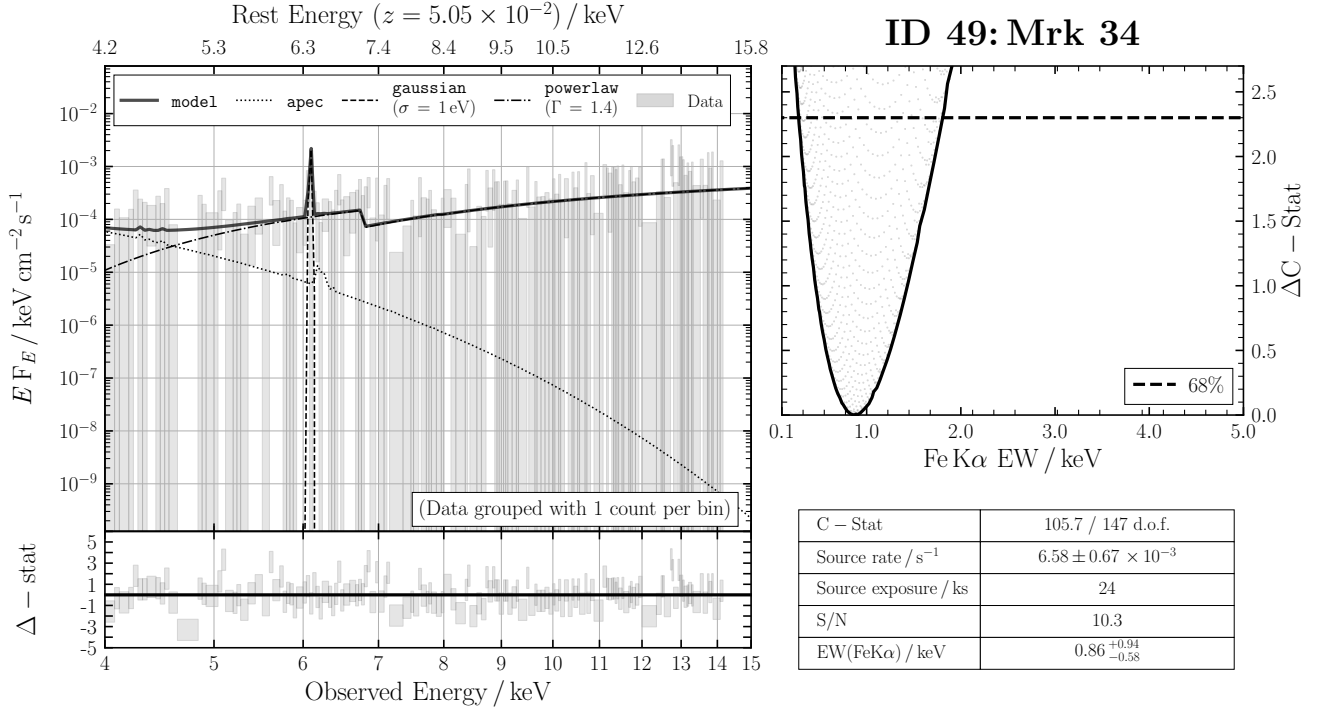


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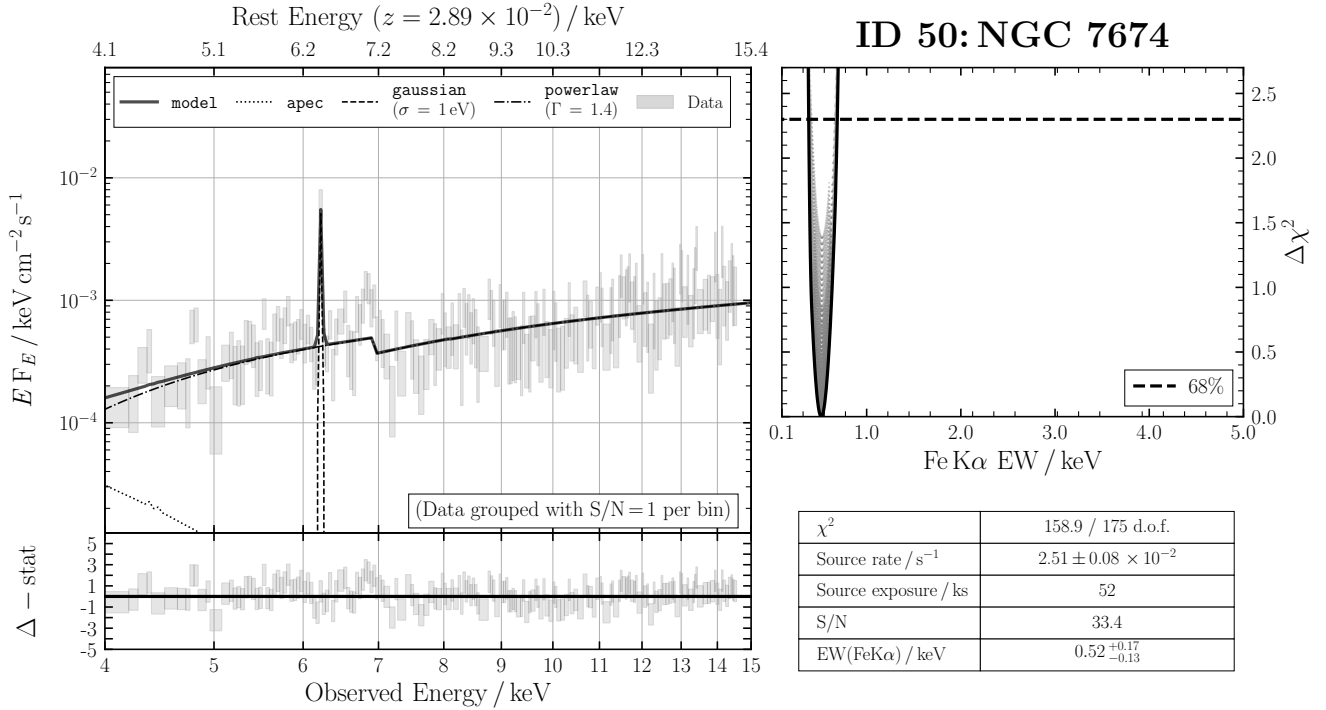


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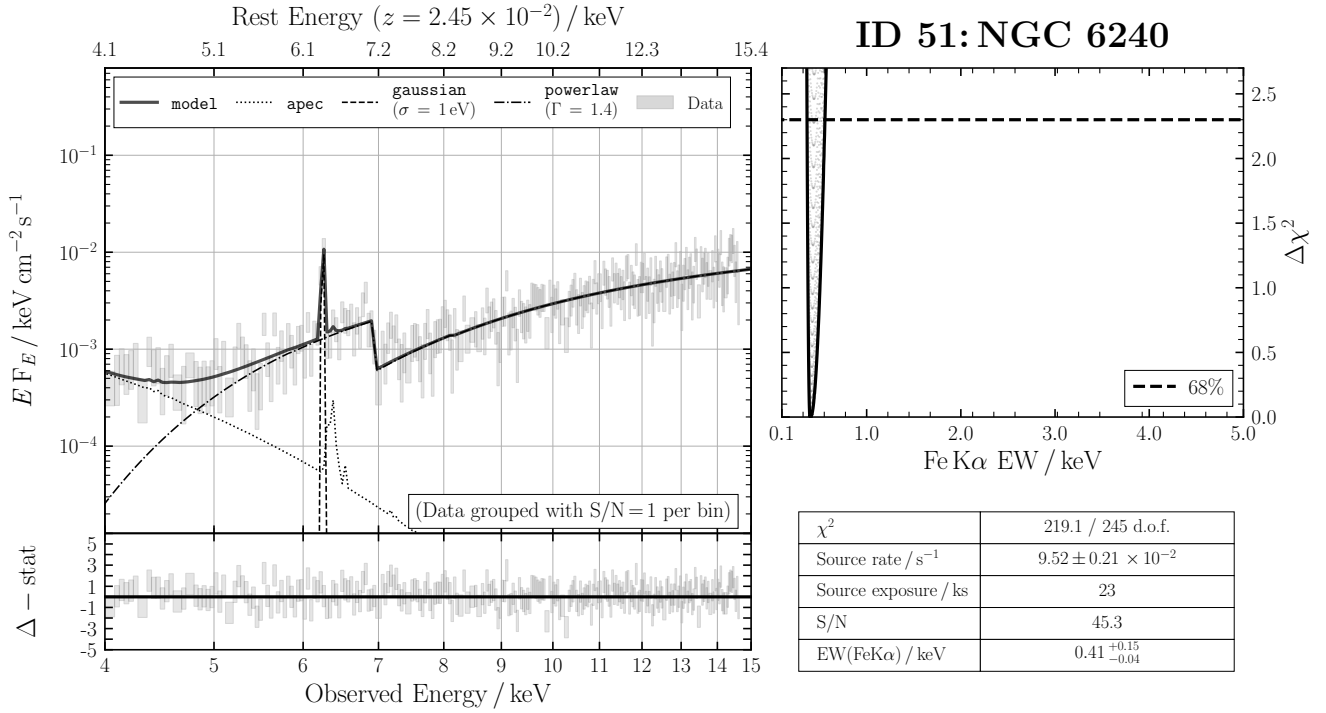


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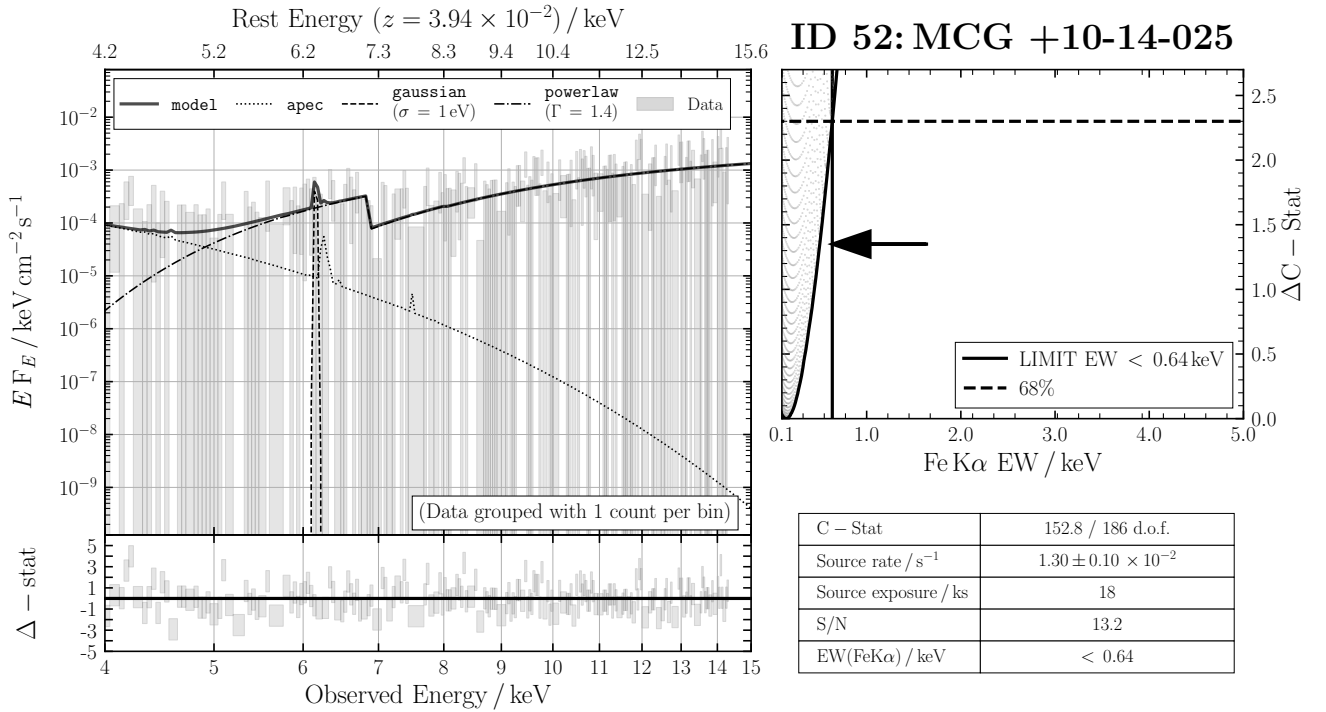


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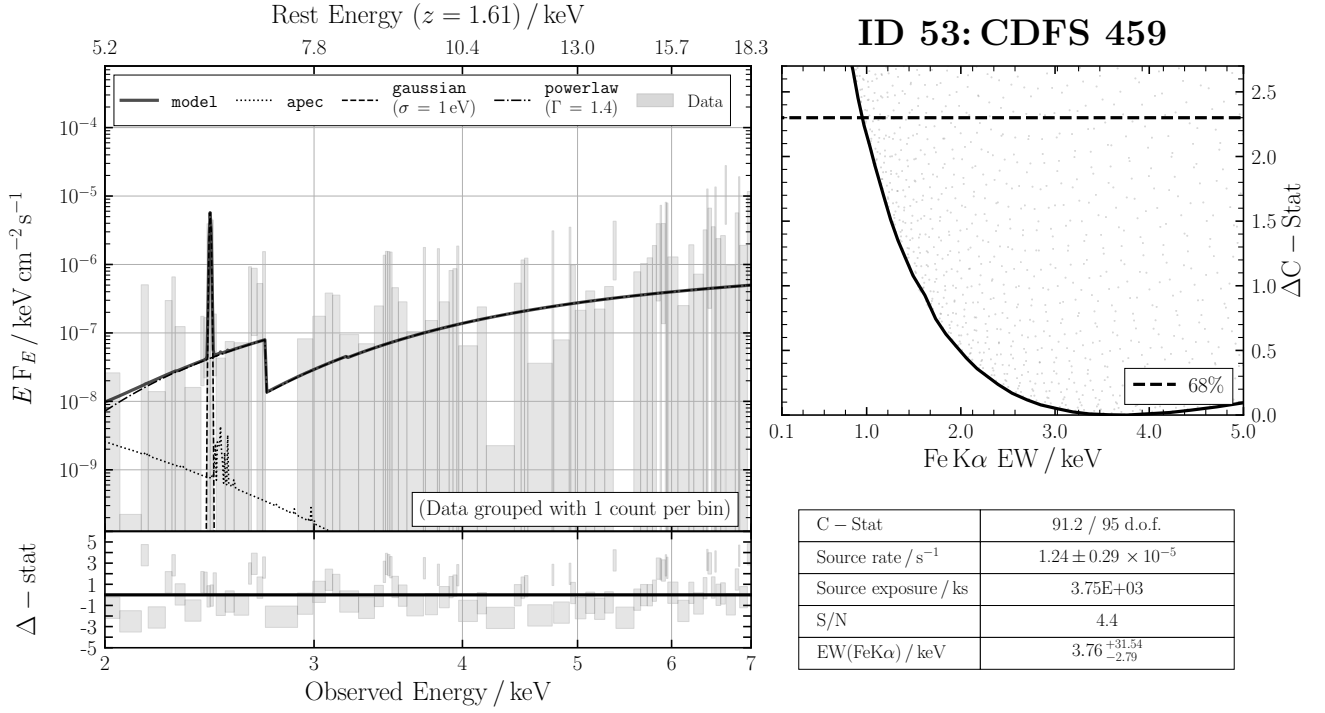


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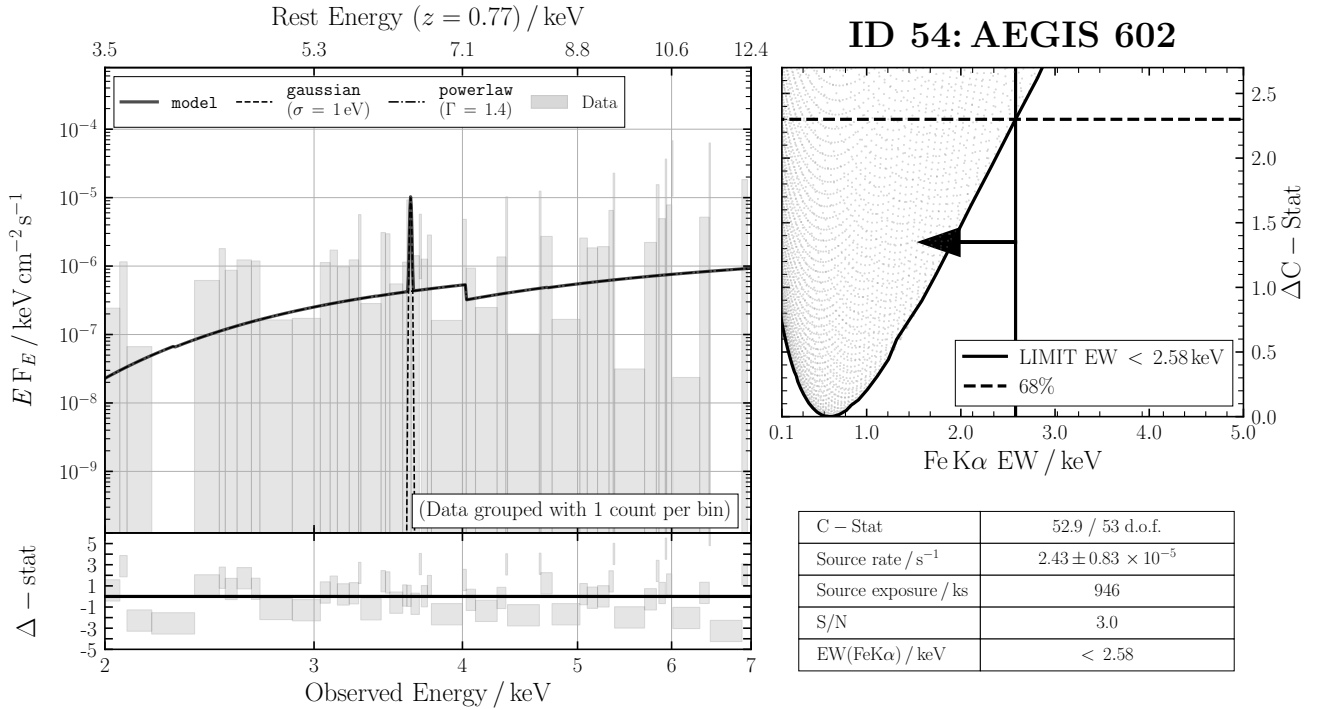


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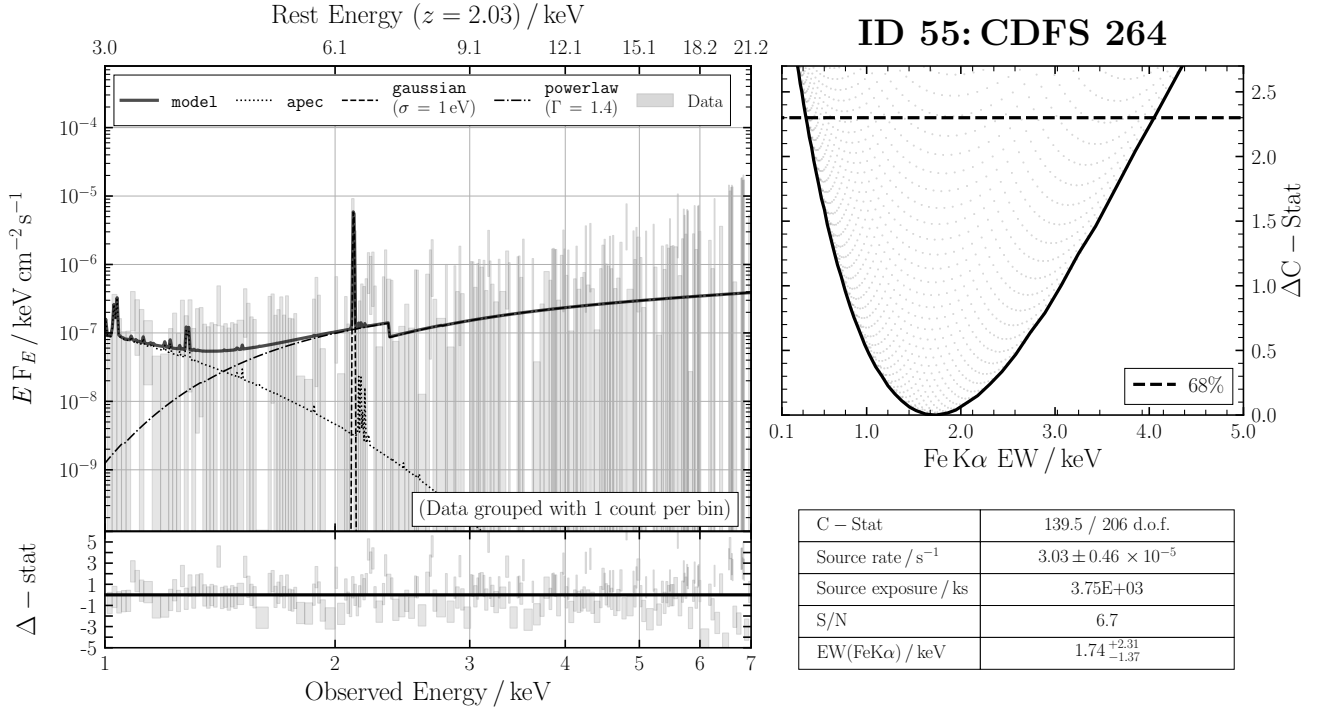


Figure B52. ID 55: CDFS 264

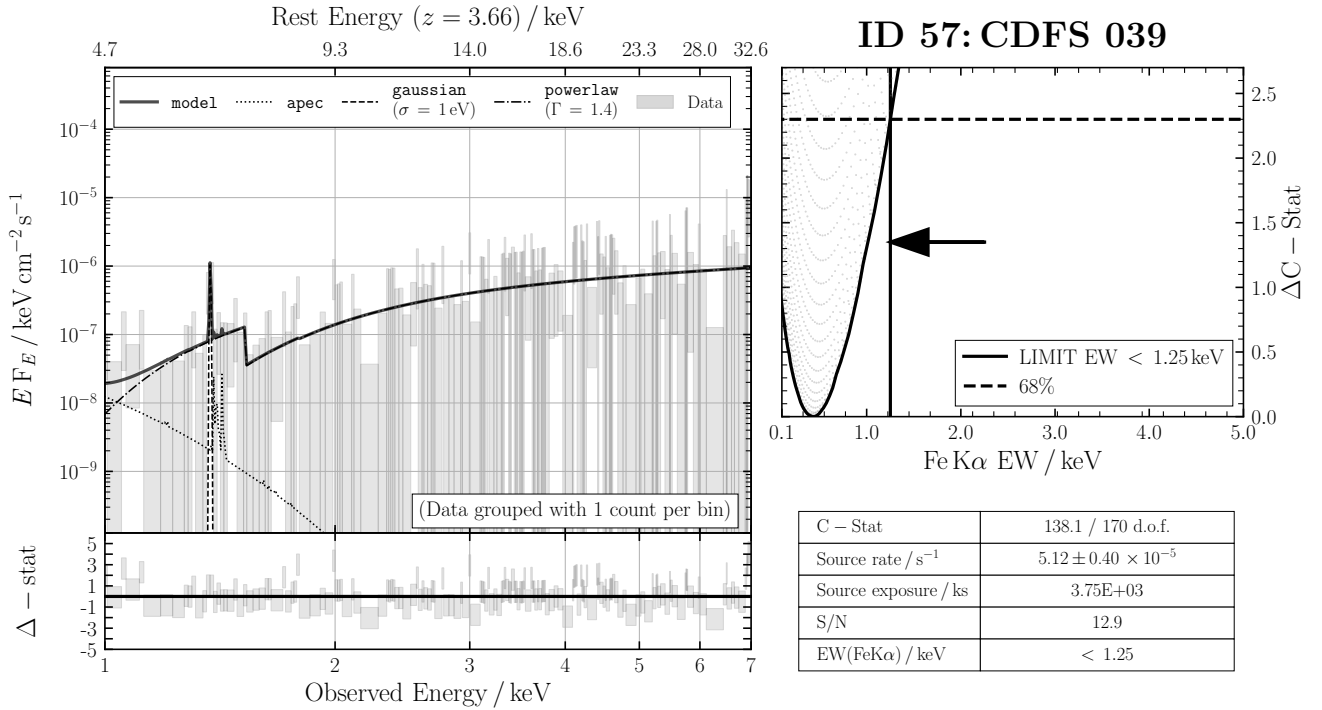


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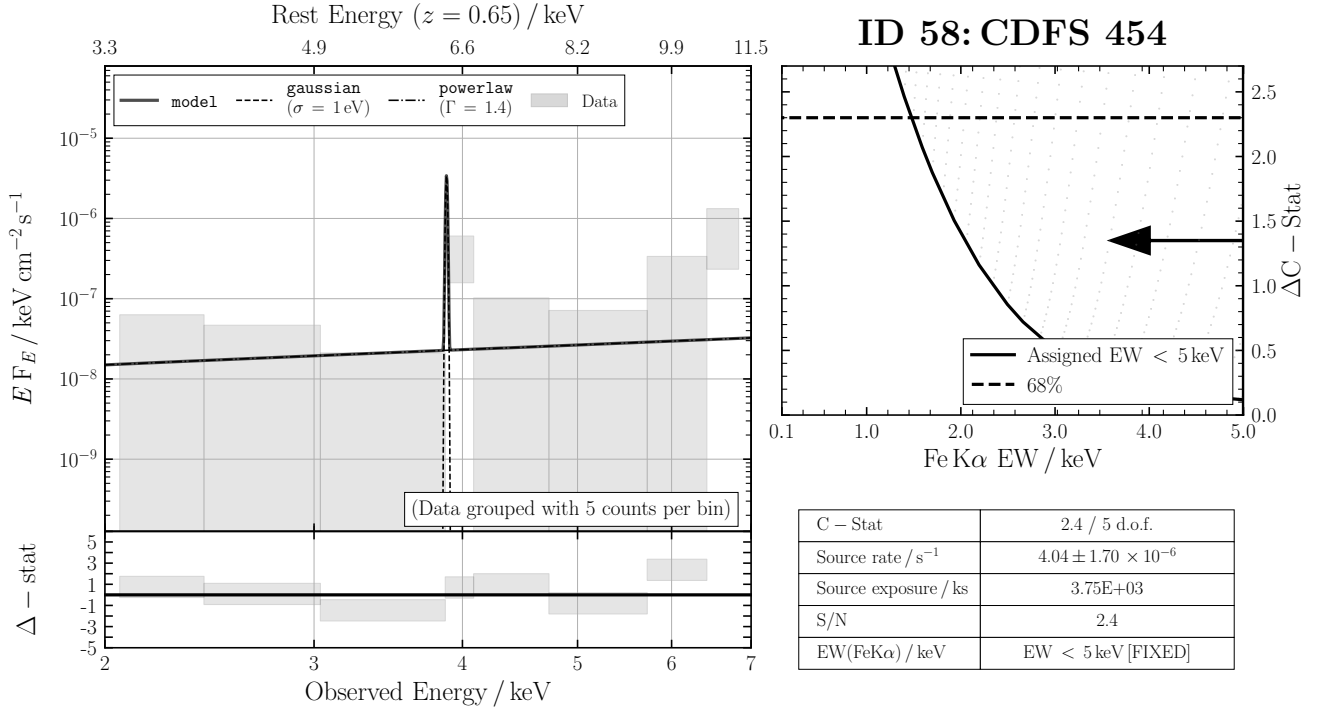


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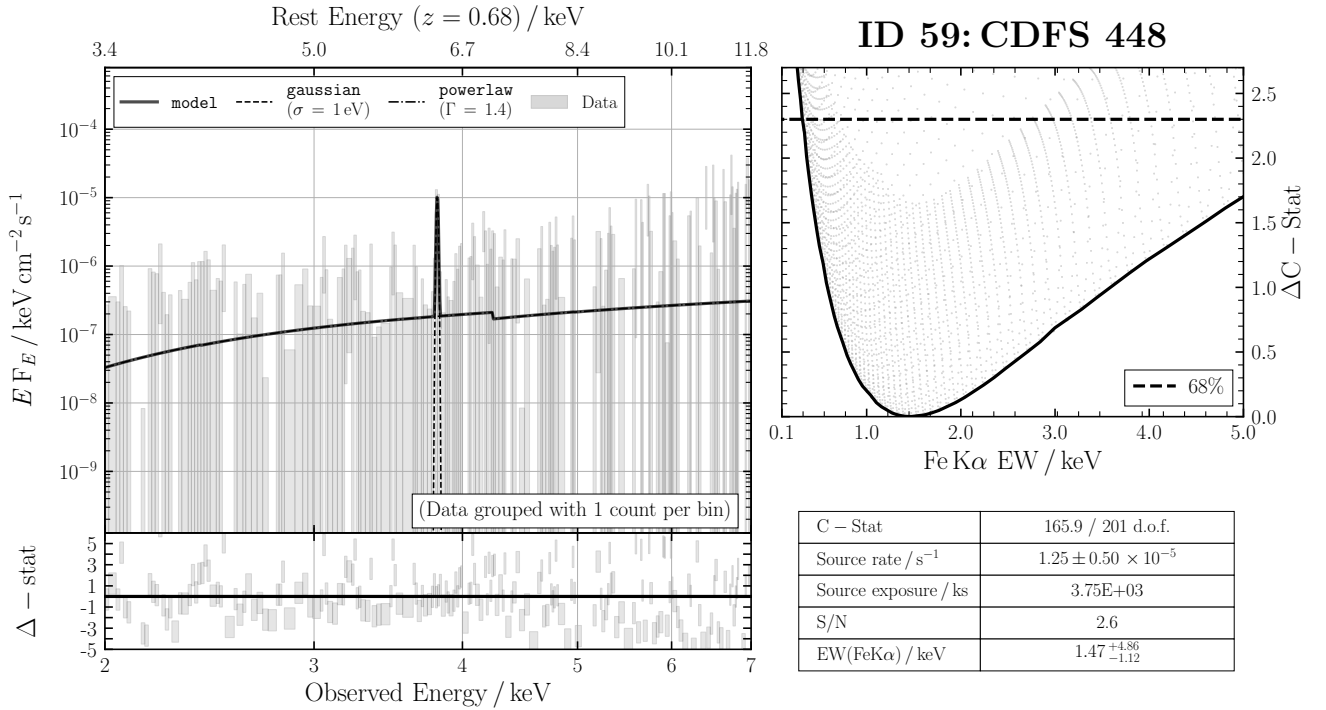


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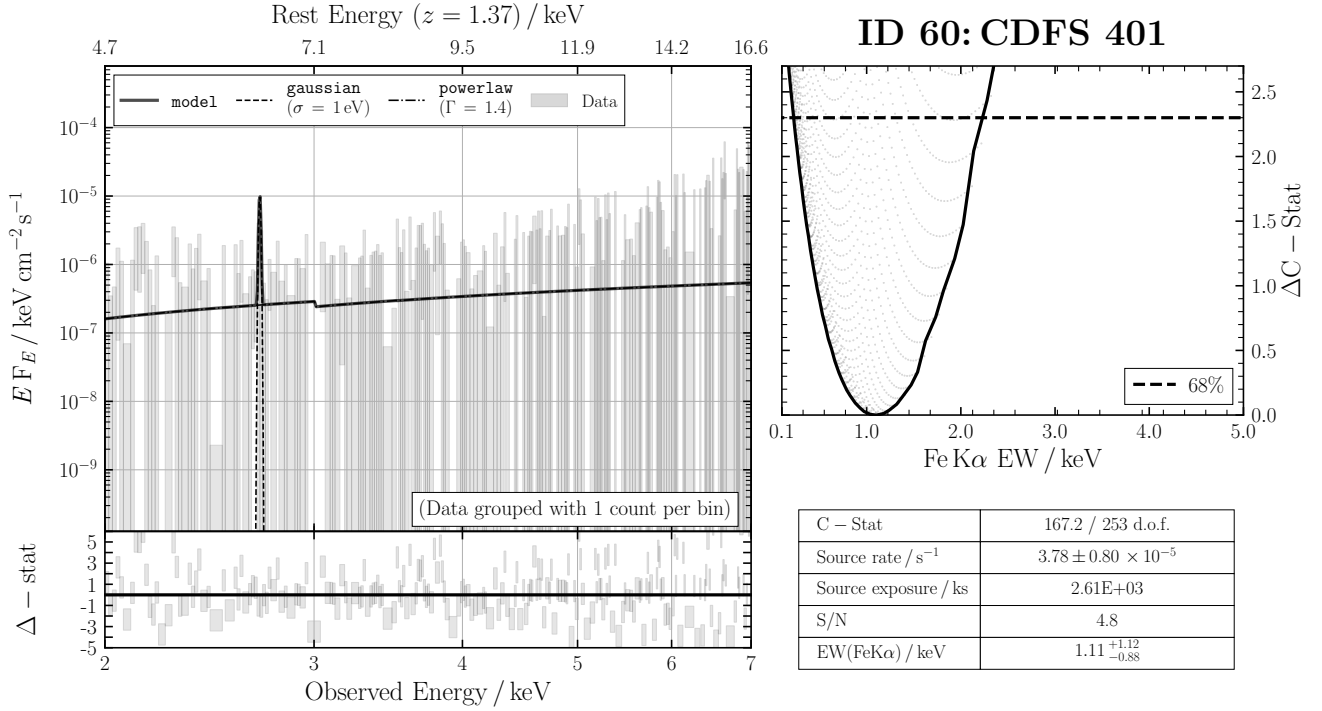


Figure B56. ID 60: CDFS 401

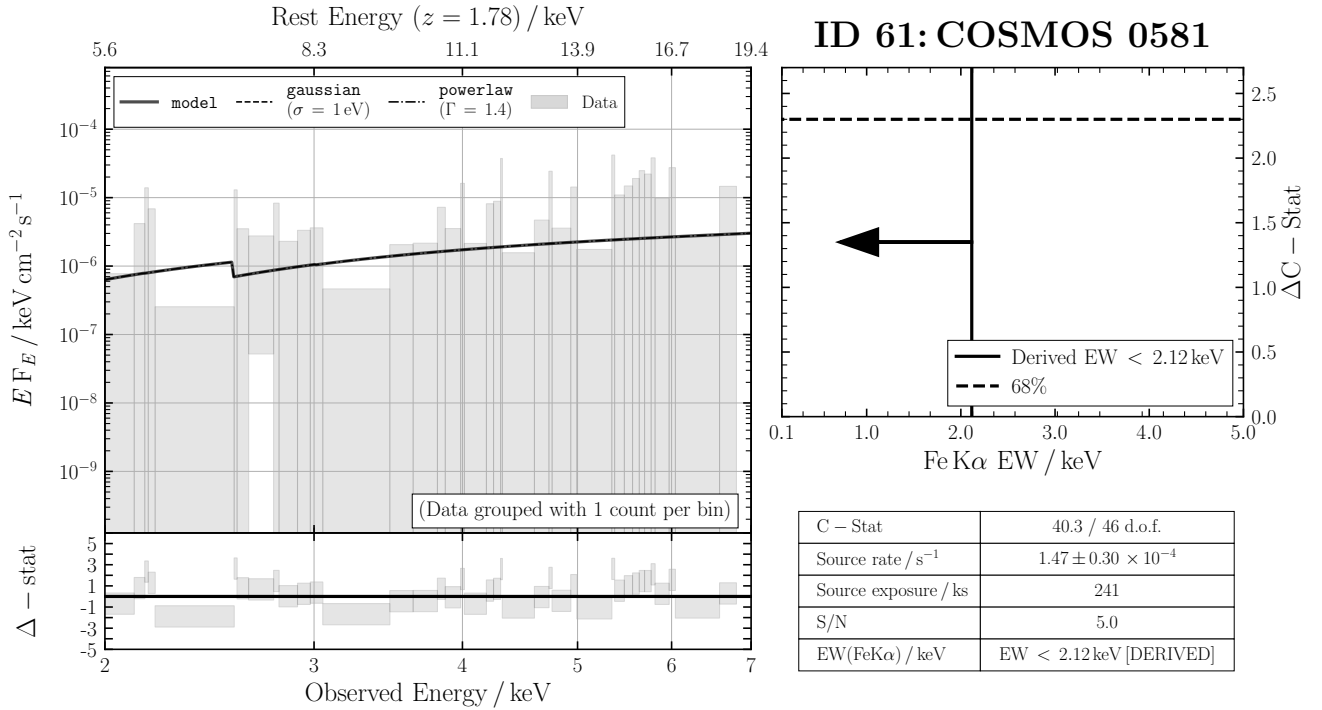


Figure B57. ID 61: COSMOS 0581

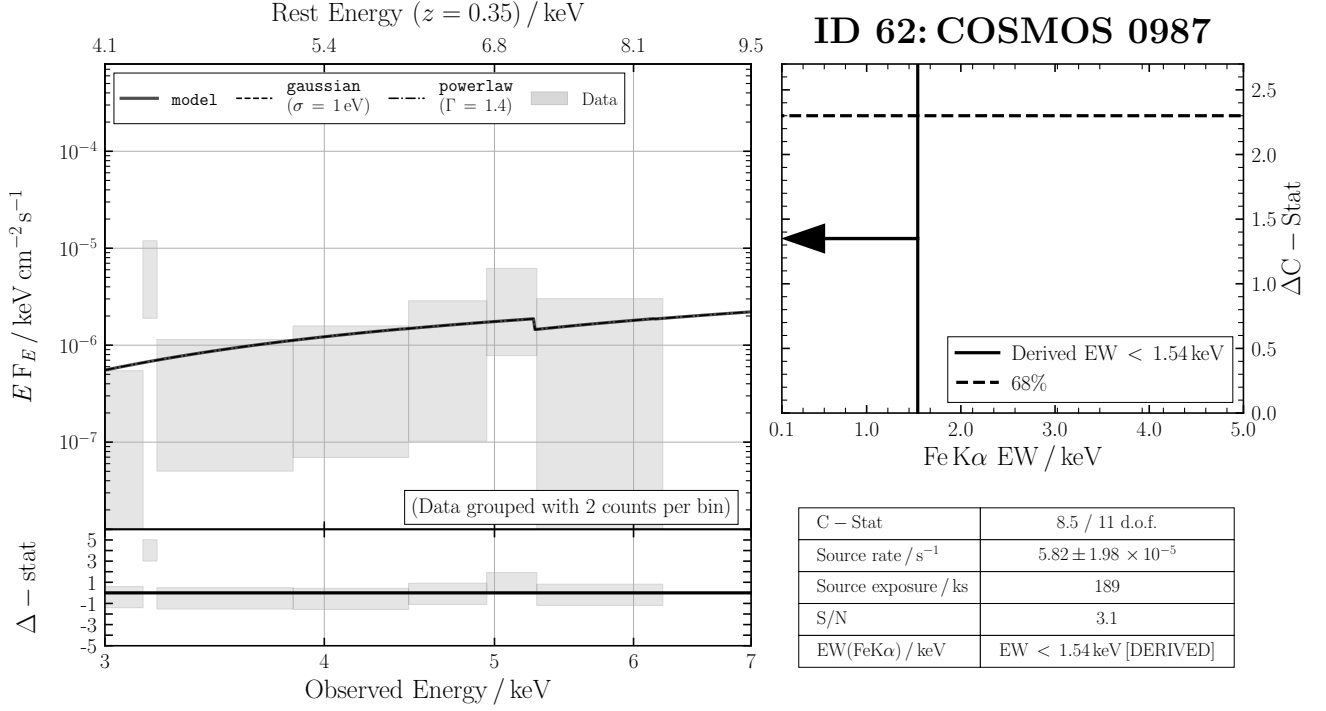


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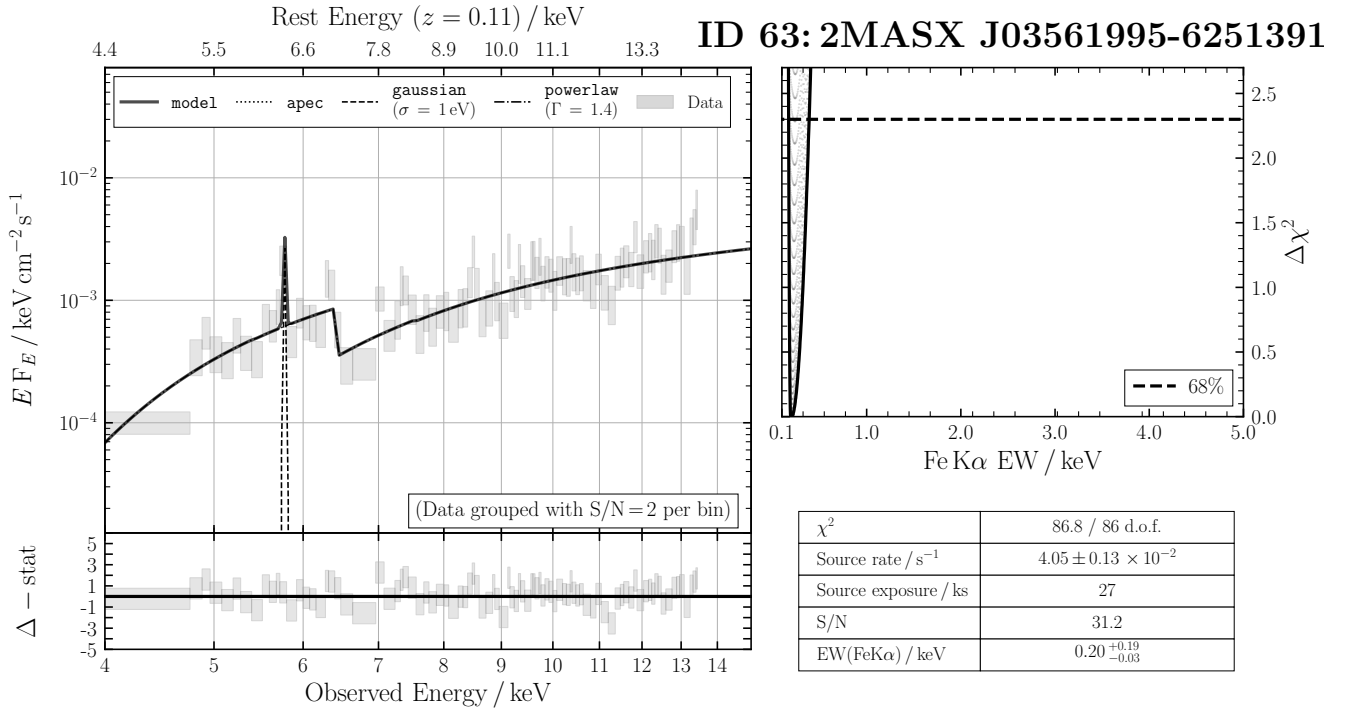
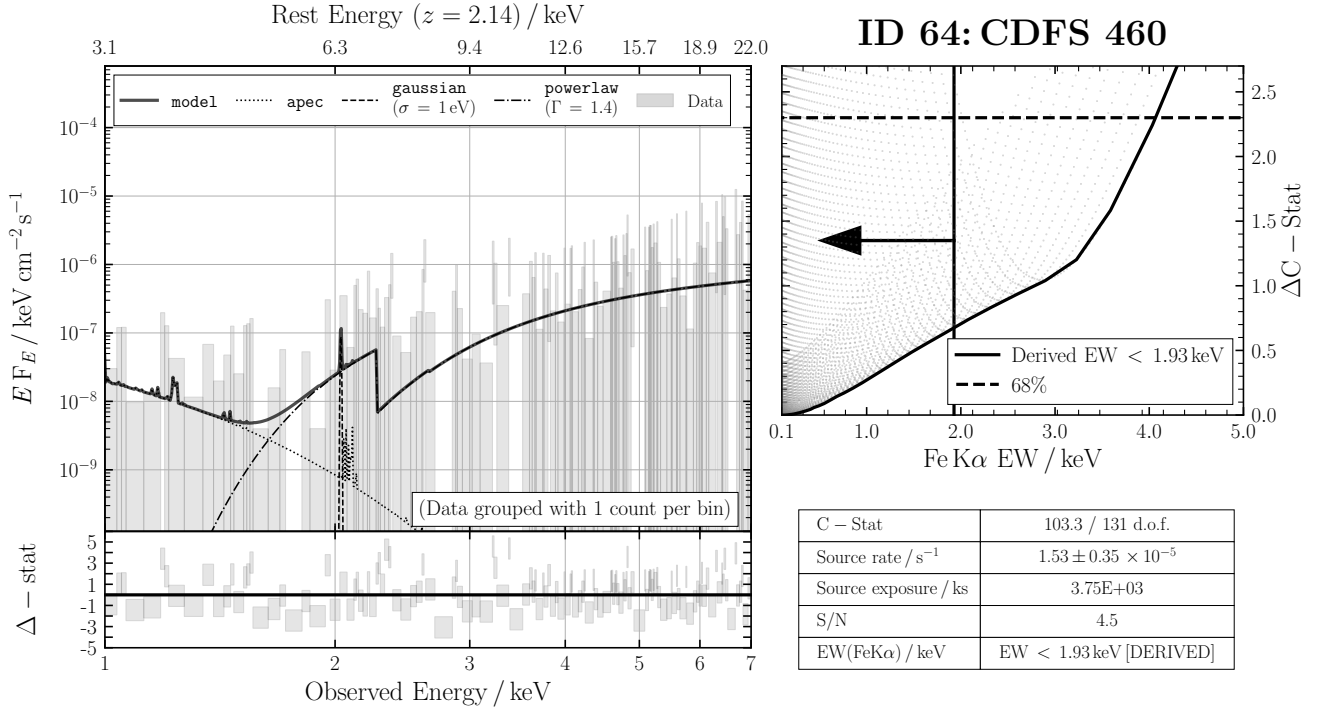
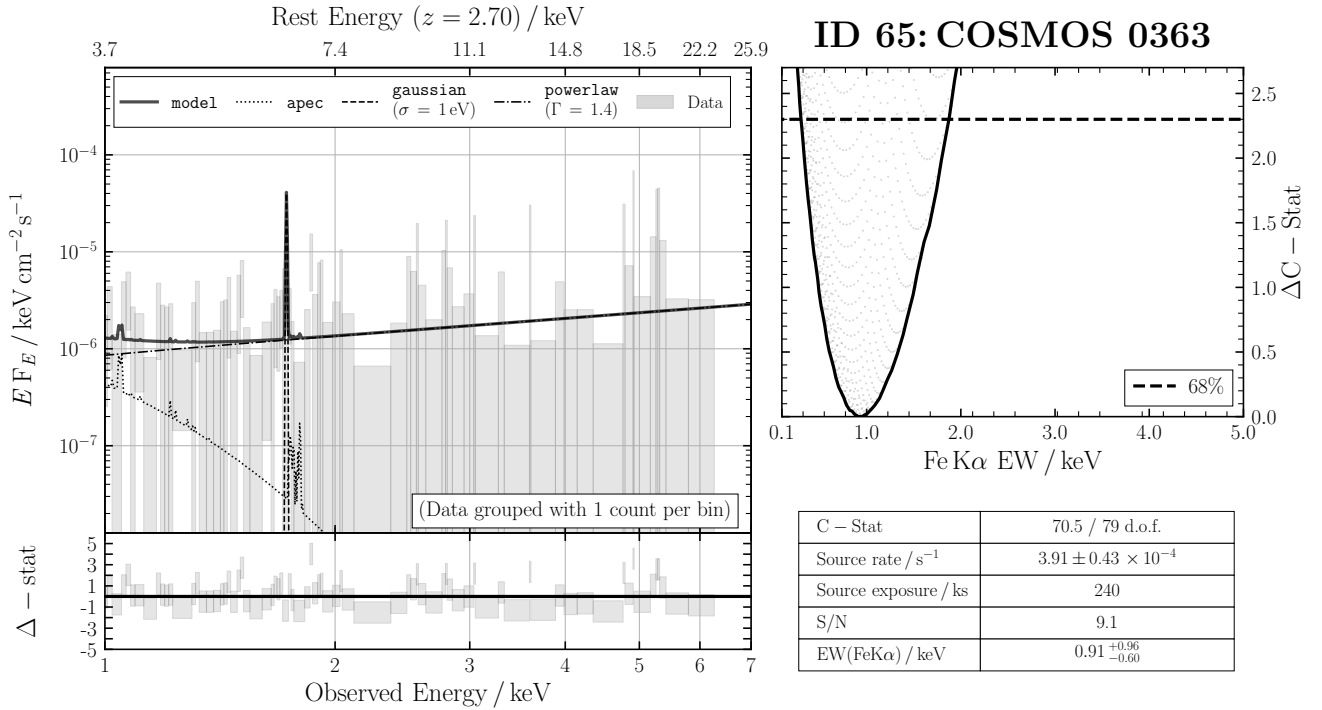


Figure B59. ID 63: 2MASX J03561995-6251391

**Figure B60.** ID 64: CDFS 460**Figure B61.** ID 65: COSMOS 0363

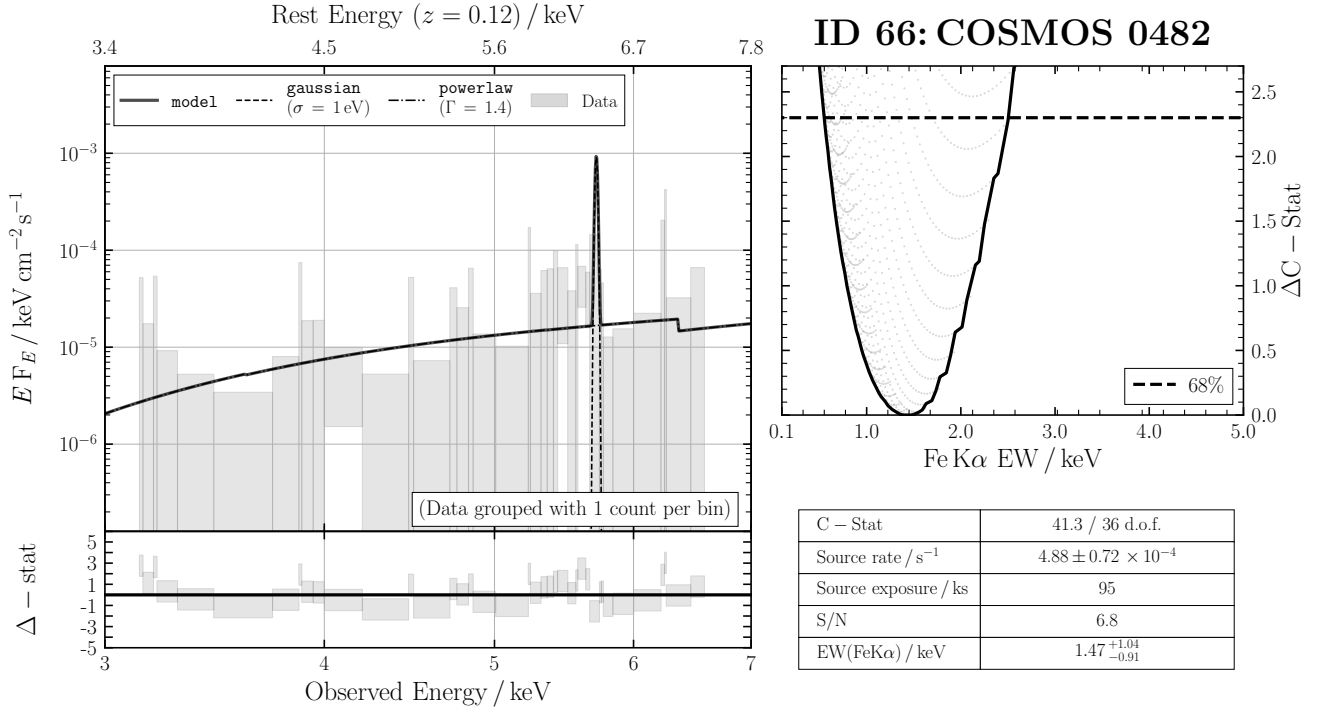


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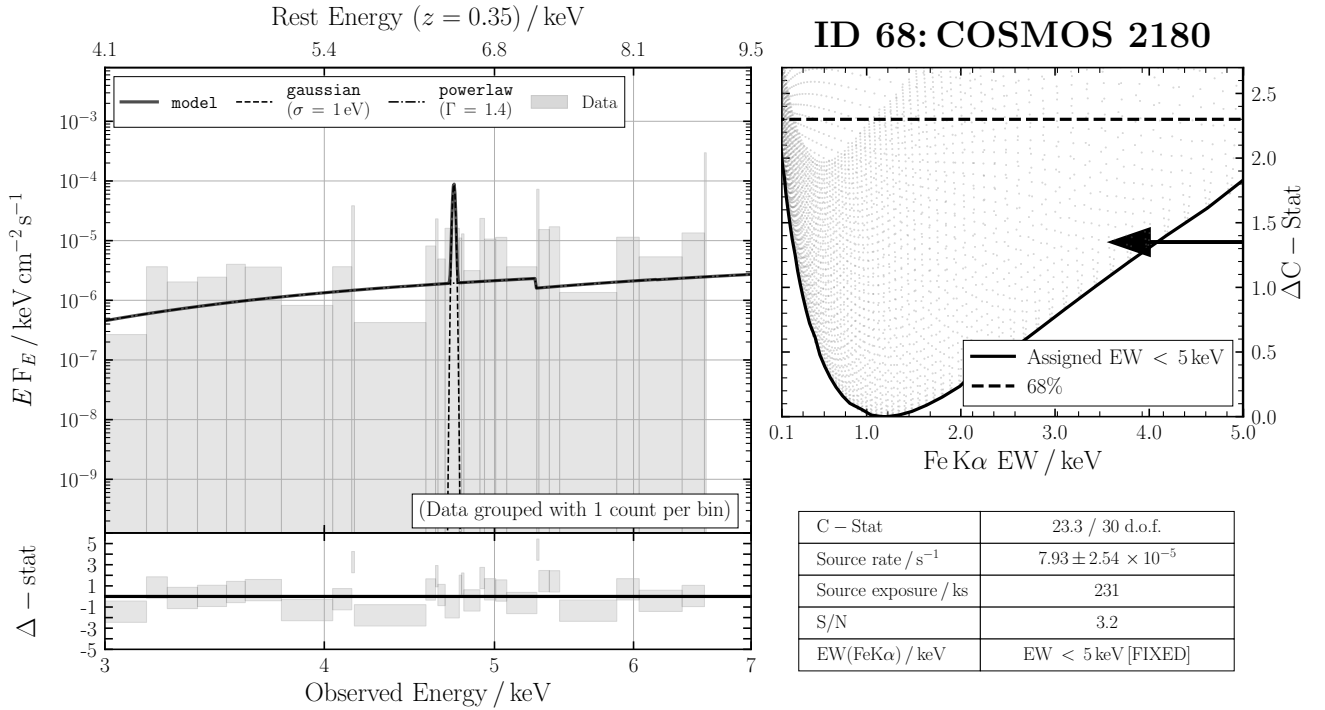


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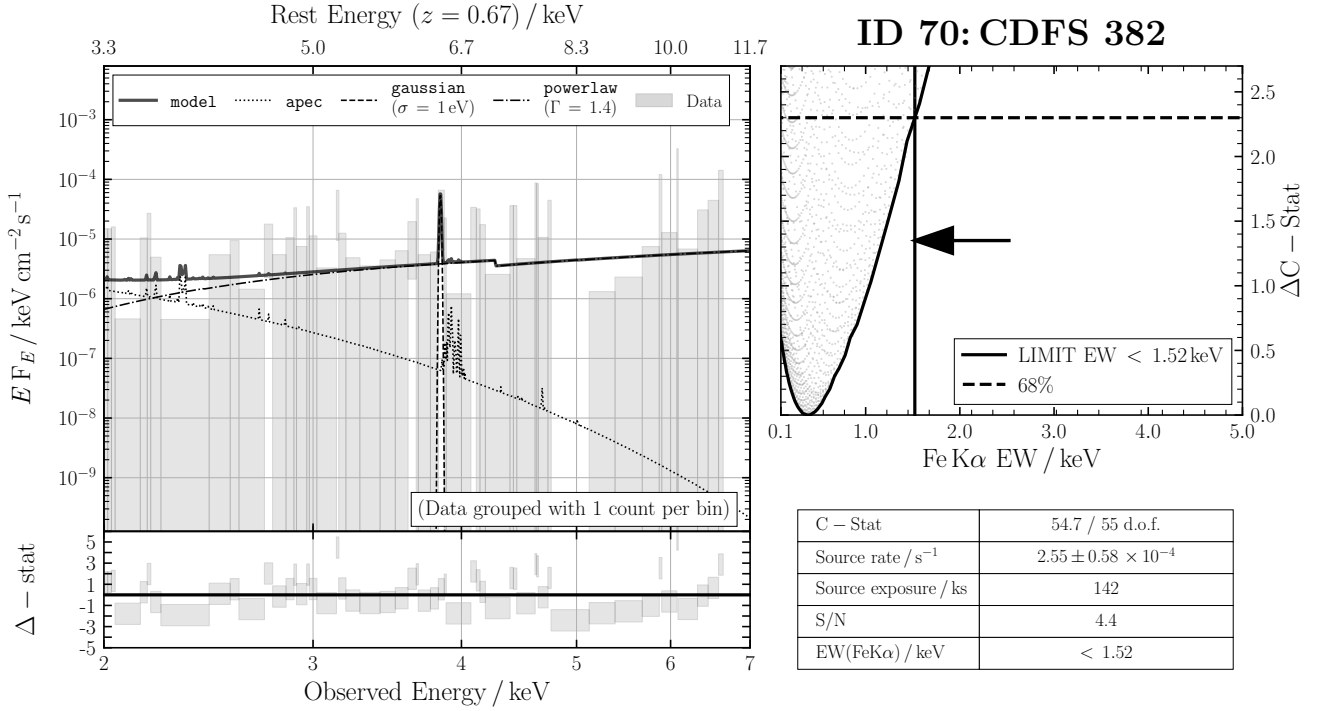


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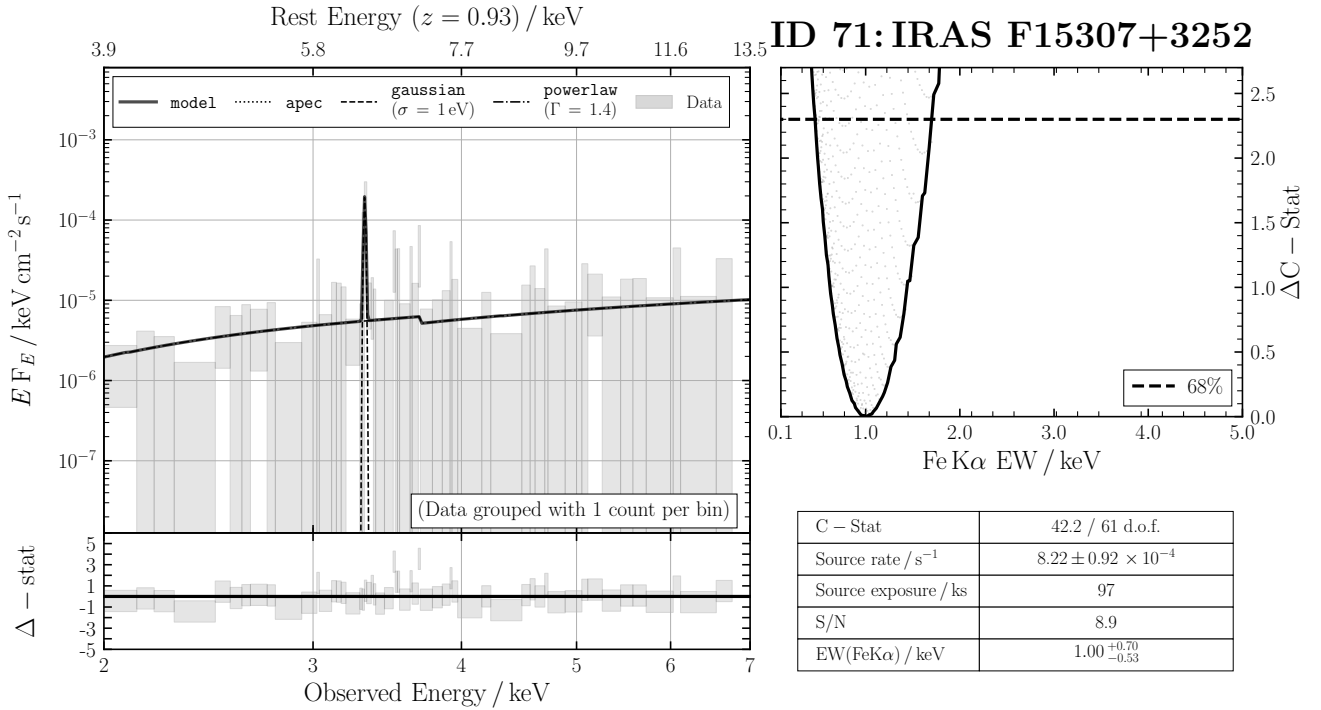


Figure B65. ID 71: IRAS F15307+3252