



Figure 5. Residuals for the best fit in different models. Black and red symbols are *NuSTAR* FPMA and FPMB spectra in the non-flare state; green and blue symbols are the spectra of the flare.

line region (Figures 4(b)–(d)), rather than in the soft X-ray band observed by *Swift*. Therefore, in the following, we fit the *NuSTAR* spectra alone.

As shown in Figures 4 and 5, a strong reflection component is apparent in the residuals of this fit (model 1), leading to a large reduced $\chi^2 = 2709.8$ for 2099 dof (see Table 2). Similar to some other Galactic X-ray binaries, the reflection component is composed of an iron $K\alpha$ emission line and a broad reflection excess (Lightman & White 1988; Miller 2007; Tomsick et al. 2014). The emission line feature was also detected in the 2002 outburst (in’t Zand et al. 2002; Göğüş et al. 2004). Following in’t Zand et al. (2002) and Göğüş et al. (2004), we used the Gaussian emission line model *Gaussian* to fit this feature and performed fits with the neutral hydrogen column density, N_H , fixed to $2.5 \times 10^{22} \text{ cm}^{-2}$ (model 2a). We also tested fits where N_H was a free parameter (model 2b). Adding a Gaussian significantly improves the spectral fits with $\Delta\chi^2 \gtrsim 400$ (see Table 2 and Figure 5). The unabsorbed disk flux fractions, i.e., the relative disk flux contribution to the total, unabsorbed flux in the 2–20 keV range, are larger than 80% for both the flare and non-flare spectra, which meet the soft state criterion of Remillard & McClintock (2006) and also confirm that the *NuSTAR* observation was taken in the soft state. The measurement of Gaussian line centroid, E_{cent} , is dependent on N_H . Freezing N_H at $2.5 \times 10^{22} \text{ cm}^{-2}$, E_{cent} is in the iron line region (6.4–7.1 keV); leaving N_H as a free

parameter, E_{cent} is well below this energy region. Given this, we then tested fits with N_H fixed at $4.3 \times 10^{22} \text{ cm}^{-2}$, the average N_H when fitting the *Swift* spectra in soft state with a two component model consisting of power-law and disk components (Section 3.1). We obtained $E_{\text{cent}1} = 6.2^{+0.2}_{-0.3} \text{ keV}$ and $E_{\text{cent}2} = 5.9 \pm 0.3 \text{ keV}$, and the line widths $\sigma_1 = 1.29^{+0.16}_{-0.14} \text{ keV}$ and $\sigma_2 = 1.51^{+0.19}_{-0.18} \text{ keV}$, respectively, for the non-flare and flare spectra, with $\chi^2/\text{dof} = 2224.1/2094$.

Instead of the Gaussian emission line model, we then used the more physical model *relionx_hc* to fit the reflection component, and replaced the simple power-law model with a power-law with an exponential cutoff *cutoffpl* (model 3). The *relionx_hc* model is an update of the model *relionx* (Ross et al. 1999; Ross & Fabian 2005), which calculates the reflected spectrum from an optically thick atmosphere ionized by illuminating X-rays with a cutoff power-law spectrum. The power-law photon index of *relionx_hc* is linked to that of *cutoffpl*. Compared with *relionx*, the folding energy *HighECut* in *relionx_hc* is a free parameter also linked to that of *cutoffpl*. In addition, the ionization parameter, ξ , and the abundance of iron, Fe/solar , extend over larger ranges in *relionx_hc*.

When left as a free parameter, the best fit value for the exponential folding energy, *HighECut*, is 500 keV, which is the upper limit of the parameter range. As this parameter is not well-constrained, we performed fits with *HighECut* fixed at 100 keV and 500 keV, respectively. Moreover, we also performed fits with Fe/solar fixed at the initial value of 1.5 and as a free parameter. Good fits with reduced χ^2 less than 1.08 were obtained if a reflection component was added. Changing *HighECut* from 100 to 500 keV, or unfreezing Fe/solar , other model parameters change only slightly, as seen for model 3a (*HighECut* = 100 keV, Fe/solar = 1.5) and model 3b (*HighECut* = 500 keV, free Fe/solar) in Table 3. Similar to the power-law photon index, the ionization parameter in the flare stage is also larger than that in the non-flare stage.

The iron $K\alpha$ emission line may be distorted by relativistic effects; therefore, a convolution model, *relconv* (Dauser et al. 2010), was adopted to calculate the relativistic smearing (model 4). The *relconv* model also allows for a broken power-law emissivity function for the incident emission. Compared with other relativistic smearing models, *relconv* extends the BH spin parameter range to negative values, corresponding to a disk rotating counter to the BH’s spin.

The fits also favored a high folding energy and were performed with *HighECut* fixed to 100 and 500 keV. We included fits with the iron abundance free and also fixed to a value of 1.5 solar. Similarly to before, freezing Fe/solar or changing *HighECut* causes little difference in the residuals and other model parameters. The inner disk radius was set to be at the innermost stable circular orbit (ISCO), and the outer disk radius was set to $400 r_g$, where $r_g = GM/c^2$ is the gravitational radius. The emissivity indices were fixed at the default values, and we noted that thawing these parameters or fixing the inner emissivity index at $3 < q_{\text{in}} < 10$ and the outer emissivity index at $0 < q_{\text{out}} < 3$ (e.g., $q_{\text{in}} = 5$ and $q_{\text{out}} = 2$, or $q_{\text{in}} = 8$ and $q_{\text{out}} = 1$) did not improve the fits significantly (the decrease in $\Delta\chi^2$ was less than 2.7). The best fit model is shown in Table 3 and Figure 5. Adding a relativistic blurring model led to only a marginally significant improvement in χ^2 . For the spin of the BH, a wide range is allowed, with the full parameter