

1. Flux scale of the RXTE PCA

The flux scale for the RXTE PCA has been adjusted to give a 2-10 keV flux of $2.4 \times 10^{-8} \text{ erg sec}^{-1} \text{ cm}^{-2}$ for deadtime corrected spectra of the Crab nebular plus pulsar. This result is achieved with the redistribution matrices (generated by *pcarmf*) and ancilliary response files (generated by *xpcaarf*) in the ftools releases 5.3 and beyond. The intention was to reproduce the flux derived from the parameterization given by Zombeck (1990):

$$\frac{dN}{dE} = 10 E^{-2.05} \text{ photons cm}^{-2} \text{ s}^{-1} \text{ keV}^{-1} \exp(-\sigma N_{HI}) \quad (1)$$

where σ is the energy dependent absorption cross section and the interstellar column density N_{HI} towards the Crab is $3 \times 10^{21} \text{ cm}^{-2}$. Note that while the goal was to match the Zombeck flux, the PCA spectra provide a spectral index of -2.1 by design (Jahoda et al. 2005). This is a relatively high flux scale for two reasons. The first is due to an error (the flux correctly derived from the Zombeck (1990) parameterization is $2.32 \times 10^{-8} \text{ erg sec}^{-1} \text{ cm}^{-2}$). Second, the 2-10 keV flux derived from the Zombeck (1990) parameterization gives one of the highest fluxes among measurements of the Crab which did not incorporate the Crab directly into their flux scale. This situation is illustrated in the figure, which displays the fluxes of an (not likely to be complete) sample of measurements which have substantial sensitivity in the 2-10 keV band. This conclusion is also illustrated in tabular form by Kirsch et al. (2005) and Seward (1992).

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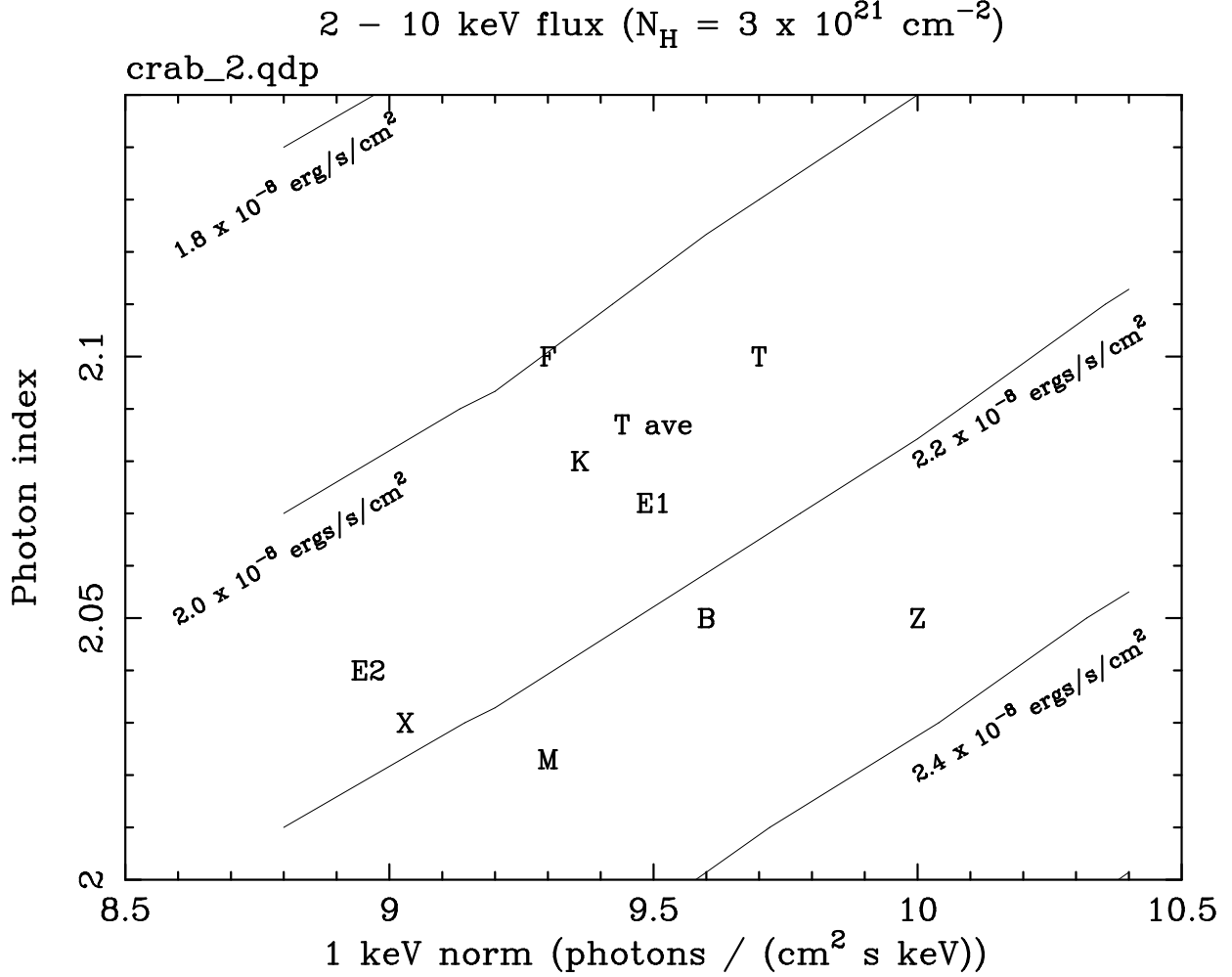


Fig. 1.— Summary of the 1 keV normalization and power-law index for numerous measurements of the Crab pulsar-plus-nebula flux. The values labelled E1 and E2 are EXOSAT pointings summarized by Seward (1992). Other values are Z (Zombeck 1990), K (Koyama et al. 1984), X (Kirsch et al. 2005), T (Toor and Seward 1974), T ave (literature average cited in Toor and Seward (1974)), M (McCammon et al. 1983), B (Burrows 1982), F (Fiore 1997). The diagonal lines give the 2-10 keV flux, assuming an interstellar column density of $3 \times 10^{21} \text{ H atoms cm}^{-2}$, comparable to all of the determinations.