RISE TIME OF HARD X-RAY BURSTS

JOAN VORPAHL

University of California, San Diego and Sacramento City College, California, U.S.A.

and

TATSUO TAKAKURA

Dept. of Astronomy, University of Tokyo, Tokyo, Japan

Summary. A study was made of the hard X-ray component in the impulsive phase of solar flares. In 36 randomly chosen events the value for the slope in the differential electron power spectrum $E^{-\delta}$ electrons $\text{cm}^{-2}\ \text{s}^{-1}\ \text{keV}^{-1}$, was related to the 20–32 keV spike rise time (*e*-folding) as $t_{\text{rise}} = 0.56 \exp(0.88\delta)$ in the thin target model and $t_{\text{rise}} = 0.10 \exp(0.88\delta)$ in the thick target picture. In the thin target model, the above empirical relation would imply that the acceleration of electrons can be longer when the acceleration rate is smaller. An alternative interpretation would be that an impulsive hard X-ray burst is a superposition of two components emitted from thin and

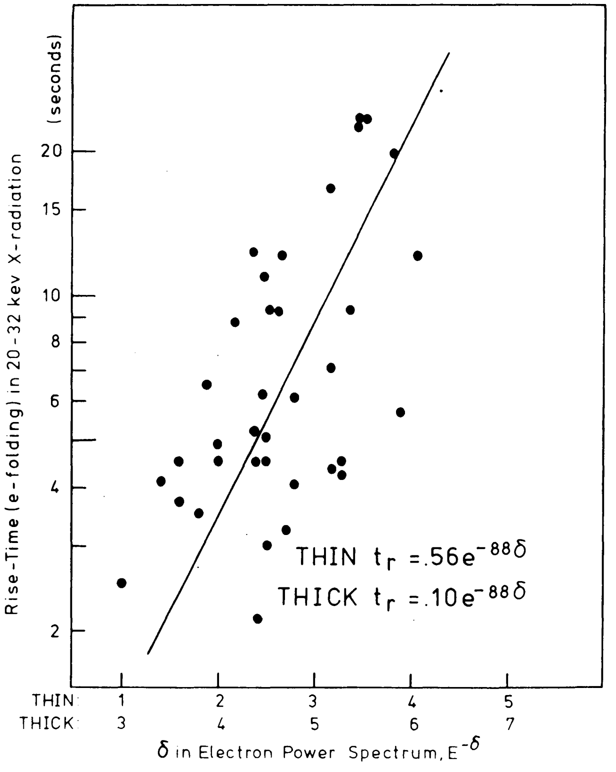

Fig. 1. Rise-time in 20–32 keV X-radiation versus electron hardness.

Sharad R. Kane (ed.), Solar Gamma-, X-, and EUV Radiation, 237–238.

thick targets; when the former predominates, the duration is longer and the photon spectral index is larger, while when the latter predominates, the duration is shorter and the photon spectral index is smaller; $3 \lesssim \delta \lesssim 4$ is required (Figure 1). The uncertainty in δ is 0.5 while that in the rise time is 1 s.