Based on a sample of ~30 rotation-powered pulsars detected by ROSAT, Becker & Trümper (1997) found that the X-ray efficiency of rotation-powered pulsars follows $L_x \approx 10^{-3} \dot{E}$, where $\dot{E}$ is the pulsar’s spin-down energy and $L_x$ is the X-ray luminosity in the 0.1 - 2.0 keV band. Ten years after the start of Chandra and XMM-Newton the number of X-ray detected pulsar exceeds ninety. Spectral information is available from almost sixty of them. Investigating the X-ray efficiency using this larger sample we find $L_x = 10^{-3} \dot{E}^{0.90 \pm 0.02}$ (correlation coefficient 0.9) for the 0.1 - 2.0 keV energy band, which is still in agreement with the earlier ROSAT result. Investigating the pulsars non-thermal spectral properties we find no evidence for a spectral hardening or softening as a function of the pulsar’s spin-down age.

**Emission properties of rotation-powered pulsars are varying with their spin-down age.** In young Crab-like pulsars non-thermal emission dominates. As the star ages the non-thermal emission is fading while the star is still hot enough to emit thermal emission from the million degree hot surface. In million year old pulsars the star has cooled down to much to show significant cooling emission and the non-thermal radiation takes over again.

**References:**