

TGRS Observations of Positron Annihilation in Classical Novae

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The TGRS experiment on board the *Wind* spacecraft has many advantages as a sky monitor — broad field of view ($\sim 2\pi$ centered on the south ecliptic pole), long life (1994–present), and stable low background and continuous coverage due to *Wind*'s high altitude high eccentricity orbit. The Ge detector has sufficient energy resolution (3–4 keV at 511 keV) to resolve a cosmic positron annihilation line from the strong background annihilation line from β -decays induced by cosmic ray impacts on the instrument, if the cosmic line is Doppler-shifted by this amount. Such lines (blueshifted) are predicted from nucleosynthesis in classical novae. We have searched the entire TGRS database for 1995–1997 for this line, with negative results. We thereby obtain an unbiased limit on the highly-uncertain Galactic nova rate. We carefully examined the times around the known nova events during this period, also with negative results. The upper limit on the nova line flux in a 6-hr interval is typically $< 3.8 \times 10^{-3}$ photon $\text{cm}^{-2} \text{s}^{-1}$ (4.6σ). We performed the same analysis for times around the outburst of Nova Vel 1999, obtaining a worse limit due to recent degradation of the detector response caused by cosmic ray induced damage. This result, $< 1.4 \times 10^{-2}$ photon $\text{cm}^{-2} \text{s}^{-1}$ (3σ), should be regarded as preliminary.