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## Final Technical Report for NASA NAG 5-3012

## Extending ROSAT Light Curves of Ecliptic Pole AGN Formation and Galaxy Evolution

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In collaboration with UCLA graduate student Fred Baganoff, Professor Malkan has obtained the longest continuous light curves ever available for a large sample ( $n=60$ ) of active galactic nuclei. This was accomplished by using the ROSAT All-Sky Survey, which covered the ecliptic pole regions once every 90-minute orbit. Using this Astrophysics Data Processing grant from NASA, we extended these light curves by combining the RASS data with pointed observations over the next several years of operation of the ROSAT PSPC. This lengthens the baselines of about half of the light curves from a few months up to a few years. The proportion of AGN showing variability increases substantially with this improvement. In fact most AGN in this representative sample are now shown to be significantly variable in the X-rays. We are also able to say something about the amplitudes of variability on timescales from days to years, with more detail than previously has been possible. We have also identified some dependence of the X-ray variability properties on a) the luminosity of the AGN; and b) the presence of a "Blazar" nucleus. By extending the ROSAT light curves, we are also able to learn more about the correlation of X-ray and optical emission on longer time-scales. It appears to be very weak, at best.

Before the completion of this work, Fred Baganoff completed his Ph.D. dissertation on the ROSAT light curves, and left UCLA to take up a post-doctoral position at MIT working on AXAF instruments. He is now preparing the chapters of his dissertation for submission to The Astrophysical Journal. We will finish this work during the 50 percent time Dr. Baganoff has available on his new job to work on his own research program.