

NICER

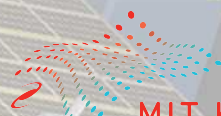
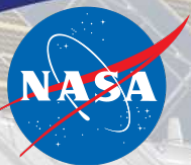
Neutron star Interior Composition Explorer

NICERDAS ARF RMF release notes

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Craig Markwardt

Keith Gendreau Zaven Arzoumanian



MIT KAVLI
INSTITUTE



MOOG



NICERDAS ARF RMF release (1)

- 1) This is the first public release of the NICER ARF and RMF.
- 2) We have tested it on 3C273 (which NICER observed as part of an IACHEC effort) and November Crab data as part of a program to adjust the physically reasonable parameters in the response to minimize χ^2 in astrophysics fit results. For instance, we created over 50 ARFs computed using different assumptions for the density of gold in the XRC mirror shells as well as mirror surface roughness- both of which are parameters with reasonable doubt in their actual value. For all these ARFs, we fit the Crab and 3C273 using known models and looked at the ARFs which yielded the best fits (only adjusting normalization). We have not introduced any "fudges" (which do not have any instrument physics) in the response to make the fits better.
- 3) We note that there are still residuals in the fits. The largest is around the oxygen edge (~ 0.5 keV). We are still trying to evaluate it. What is in the response matches our best understanding of what is actually in the instrument. There are also probably still small gain induced residuals near the Si (~ 1.84 keV) and Au (~ 2.2 keV) edges.



NICERDAS ARF RMF release (2)

- 4) Performance of continuum response above ~ 6 keV is not verified beyond the $\sim 20\%$ level. Reported cut-offs or roll-overs in spectra above this energy should be heavily scrutinized.
- 5) Overall absolute flux calibration error should be assumed to be 20%.
- 6) Response matrix has been tuned for orbit night conditions. Observations in orbit day should be scrutinized for gain shifts and for resolution degradation.
- 7) This response assumes that 52 detectors are used. Sometimes, we switch off detectors and sometimes, users may wish to ignore some noisier detectors (particularly during low Sun Angle observations).
- 8) Eventually, the NICER team will build a response generator that produces observation specific responses.