Abstract Submitted
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Gamma ray burst contributions from natural nuclear criticality events[1] ROBERT HAYES, North Carolina State University, RDNA TEAM — The energy spectra from the rising and trailing edges of fast rise exponential decay (FRED) gamma ray bursts (GRB) along with the time dependence of its exponential decay is shown to be effectively identical to that from terrestrial pulsed criticality events. This is argued to occur in a similar fashion as that of the Oklo event (Krane 1988). The Oklo natural nuclear reactor from Gabon Africa went critical around a billion years ago having at that time enriched uranium present due to reverse radioactive decay of the shorter half-life fissile isotope ^{235}U. The same event which gave rise to Oklo (and the tightest constraints on the fine structure constant) are argued to still be present in the interstellar media providing new criticality events in accretion disks. These would pulse as they become critical, thermally expand driving them subcritical and then coalescing again by gravity into a critical accretion disk sectional mass giving rise to pulsing. In this sense, it has been shown that all the major features seen in FRED GRB can be explained by criticality events comparable to the Oklo event (Hayes 2013). Source terms from neutron star mergers are then considered in terms of potential contributors including long lived isotopic abundances. References: Hayes R. B (2013) Nuclear criticality as a contributor to gamma ray burst events. Astrophys. Space Sci. 345, 147-154. Krane K (1988) Introductory Nuclear Physics; John Wiley and Sons; ISBN 978-0471805533

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