

## Did gamma ray burst induce Cambrian explosion?

*Monday, 16 May 2022 12:25 (35 minutes)*

One longstanding mystery in bio-evolution since Darwin's time is the origin of the Cambrian explosion that happened around 540 million years ago (Mya), where an extremely rapid increase of species occurred. Here we suggest that a nearby GRB event 500 parsecs away, which should occur about once per 5 Gy, might have triggered the Cambrian explosion. Due to a relatively lower cross section and the conservation of photon number in Compton scattering, a substantial fraction of the GRB photons can reach the sea level and would induce DNA mutations in organisms protected by a shallow layer of water or soil, thus expediting the bio-diversification. This possibility of inducing genetic mutations is unique among all candidate sources for major incidents in the history of bio-evolution. A possible evidence for our theory would be the anomalous abundance of certain nuclear isotopes with long half-lives transmuted by the GRB photons in geological records from the Cambrian period. Our notion also imposes constraints on the evolution of exoplanet organisms and the migration of panspermia.

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**Session Classification:** Morning session