

Lethal radiation from nearby supernovae helps to explain the small cosmological constant

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The observed value Λ_{obs} of the cosmological constant Λ is extremely smaller than theoretical expectations, and the anthropic argument has been proposed as a solution to this problem because galaxies do not form when $\Lambda \gg \Lambda_{obs}$. However, the contemporary galaxy formation theory predicts that stars form even with a high value of $\Lambda/\Lambda_{obs} \sim 50$, which makes the anthropic argument less persuasive. Here we calculate the probability distribution of Λ using a model of cosmological galaxy formation, considering extinction of observers caused by radiation from nearby supernovae. The life survival probability decreases in a large Λ universe because of higher stellar density. Using a reasonable rate of lethal supernovae, we find that the mean expectation value of Λ can be close to Λ_{obs} , and hence this effect may be essential to understand the small but nonzero value of Λ . It is predicted that we are located on the edge of habitable regions about stellar density in the Galaxy, which may be tested by future exoplanet studies.

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