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The potential influence of marine bioluminescence on deep-sea neutrino detection

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Marine bioluminescence, the natural emission of light by organisms like certain bacteria, jellyfish, and plankton, serves vital ecological functions in the dark depths of the ocean, aiding in communication, camouflage, and predation. This phenomenon introduces a unique challenge for deep-sea neutrino detection projects, These detectors aim to capture neutrino interactions in the assumed darkness of the deep sea. However, bioluminescent organisms create unexpected sources of light, adding background noise that can interfere with neutrino detection. Observations from ANTARES, P-ONE and similar projects reveal that bioluminescence complicates data by producing transient light signals, which may mimic neutrino events. This has prompted the development of improved algorithms and filtering techniques to distinguish bioluminescent activity from genuine neutrino interactions. Besides refining detection methods, these observations also offer valuable insights into deep-sea biology, revealing the behaviors and patterns of bioluminescent organisms. Thus, neutrino detection projects contribute to both high-energy physics and marine biology, enhancing our understanding of the deep-sea ecosystem and the potential impact of bioluminescence on scientific instrumentation in these dark environments.

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