What we can learn from the intensity-time profiles of large gradual solar energetic particle events?

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Large gradual solar energetic particle events (LGSEPEs, $\geq$10pfu in the >10MeV channel as measured by GOES) are closely associated with coronal mass ejections (CMEs). The intensity-time profile of a LGSEPE reveals important information on the moving directions of a CME or an interplanetary CME (ICME). This paper analyzes the moving directions of ICMEs, using the intensity-time profiles of 5 typical solar energetic particle events, and discusses their applications in predicting geomagnetic storms.