

Sun, Space Weather, and Solar-Stellar Connection



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Quasi-Periodic Oscillations in Si IV Doppler Velocity During an M-6.5 Class Solar Flare

Quasi-periodic oscillations (QPOs) observed in the solar chromosphere and transition region during flares offer valuable insights into the atmospheric response to sudden energy releases and the evolution of the magnetic field. We analyzed an M-6.5 class flare observed by the Interface Region Imaging Spectrograph (IRIS), emphasizing QPOs in the Doppler velocity measured in the Si IV line at the flare ribbons. Our findings reveal variations in the periods of oscillatory signals during different phases of the flare. Specifically, during the flare's impulsive phase, Doppler velocity oscillations with a periodicity of approximately 5 minutes were observed. Pre-flare oscillations exhibited maximum power at around 3 minutes. However, during the gradual decay phase of the flare, longer-period oscillations (~8-12 minutes) were detected in and around the flare ribbons. We interpret the shift to a 5-minute periodicity during the impulsive phase as indicative of a change in the formation height of the Si IV line, corresponding to a deeper atmospheric layer responding to the local acoustic cut-off frequency. Additionally, the extended-period oscillations observed during the decay phase may be attributed to a reorientation of the magnetic field, which could become more inclined post-flare.

Contribution Type

Theme

Energetic Phenomena

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