Spectroscopic evidence for helicity in explosive events

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We report spectroscopic observations in support of a novel view of transition region explosive events, observations that lend empirical evidence that at least in some cases explosive events may be nothing else than spinning narrow spicule-like structures. Our spectra of textbook explosive events with simultaneous Doppler flow of a red and of a blue component are extreme cases of high spectro-scopic velocities that lack apparent motion, to be expected if interpreted as a pair of collimated, linearly moving jets. The awareness of this conflict led us to the alternate interpretation of redshift and blueshift as spinning motion of a small plasma volume. In contrast to the bidirectional jet scenario, a small volume of spinning plasma would be fully compatible with the observation of flows without detectable apparent motion. We suspect that these small volumes could be spicule-like structures and try to find evidence. We show observations of helical motion in macrospicules and argue that these features - if scaled down to a radius comparable to the slit size of a spectrometer - should have a spectroscopic signature similar to that observed in explosive events, while not easily detectable by imagers. Despite of this difficulty, evidence of helicity in spicules has been reported in the literature. This inspired us to the new insight that the same narrow spinning structures may be the drivers in both cases, structures that imagers observe as spicules and that in spectrometers cross the slit and are seen as explosive events. We arrive at a concept that supports the idea that explosive events and spicules are different manifestations of the same helicity driven scenario. Consequently, in such a case, a photospheric or subphotosperic trigger has to be assumed.

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