Undercover EUV Solar Jets Observed by the Interface Region Imaging Spectrograph

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It is well-known that extreme ultraviolet (EUV) emission emitted at the solar surface is absorbed by overlying cool plasma. Especially in active regions, dark lanes in EUV images suggest that much of the surface activity is obscured. Simultaneous observations from the Interface Region Imaging Spectrograph, consisting of UV spectra and slit-jaw images (SJI), give vital information with sub-arcsecond spatial resolution on the dynamics of jets not seen in EUV images. We studied a series of small jets from recently formed bipole pairs beside the trailing spot of active region 11991, which occurred on 2014 March 5 from 15:02:21 UT to 17:04:07 UT. Collimated outflows with bright roots were present in SJI 1400 Å (transition region) and 2796 Å (upper chromosphere) that were mostly not seen in Atmospheric Imaging Assembly (AIA) 304 Å (transition region) and AIA 171 Å (lower corona) images. The Si iv spectra show a strong blue wing enhancement, but no red wing, in the line profiles of the ejecta for all recurrent jets, indicating outward flows without twists. We see two types of Mg ii line profiles produced by the jets spires: reversed and non-reversed. Mg ii lines remain optically thick, but turn optically thin in the highly Doppler shifted wings. The energy flux contained in each recurrent jet is estimated using a velocity differential emission measure technique that measures the emitting power of the plasma as a function of the line-of-sight velocity. We found that all the recurrent jets release similar energy (10^8 erg cm^{-2} s^{-1}) toward the corona and the downward component is less than 3%.