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Blowout Jets: X-ray jets made by blowout eruption of the jet-base bipole

Ronald L. Moore
NASA/Marshall Space Flight Center

Jonathan W. Cirtain
NASA/Marshall Space Flight Cener

Alphonse C. Sterling
NASA/Marshall Space Flight Center

David A. Falconer
NSSTC/UAHuntsville

Abstract. Yamauchi et al (2004, ApJ, 605, 511) found that there are two structurally and dynamically disticnt types of H-alpha macrospicules in polar coronal holes: spiked jets and erupting loops. The form and motion of the spiked jets fit the standard reconnection picture for solar X-ray jets (Shibata et al 1992, PASJ, 44, L173). The form and motion of the erupting loops is like that of the erupting filament in the birth of a CME. That roughly half of all polar H-alpha macrospicules are the erupting-loop type suggests that there is a large class of X-ray jets in which the jet-base magnetic bipole undergoes a blowout eruption as in a CME, instead of staying closed as in the standard picture for X-ray jets. Along with a cartoon of the standard picture, we present a cartoon depicting the sigatures expected of a blowout jet in coronal X-ray images. From Hinode/XRT movies and STEREO/EUVI snapshots in polar coronal holes, we show (1) examples of X-ray jets that fit the standard picture, and (2) other examples that do not fit the standard picture but do show signatures appropriate for blowout jets. These signatures are (1) a flare arcade inside the jet-base bipole in addition to the outside flare arcade of standard X-ray jets, (2) an extra jet strand that should not be produced by the reconnection for standard jets but could be produced by reconnection between the ambient unipolar open field and one leg of an erupting core-field flux rope that is blown out of the base bipole, and (3) ejection of cooler (T $<$ 100,000 K) plasma (seen in He II 304 emission) entwined with the jet's X-ray plasma. We therefore infer that these "non-standard" jets are blowout jets, jets made by miniature versions of the sheared-core-bipole explosions that produce bubble-type CMEs. In open ambient field, a blowout jet might escape into the outer corona and solar wind as a coronal jet that includes a miniature CME plasmoid. This work was funded by NASA's Science Mission Directorate through the Heliophysics Guest Investigators Program, the Hinode Project, and the Living With a Star Targeted Research & Technology Program.