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Direct Observation of A Large-scale CME Flux Rope Event Arising from an Unwinding Coronal Jet

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Increasing observations show that coronal jets may result in bubble-shaped coronal mass ejections (CMEs), but the genesis of jet-driven CMEs and their nature are not fully understood. Here, we report a direct stereoscopic observation on the magnetic coupling from a coronal blowout jet to a stellar-sized CME. Observations in the EUV passbands of SDO/AIA show that this whole event starts with a small-scale active-region filament whose eruption occurs at a coronal geyser site due to flux emergence and cancellation. By interacting with an overlying null-point configuration, this erupting filament first breaks one of its legs and triggers an unwinding blowout jet. The release of magnetic twist in its jet spire is estimated at around 1.5–2.0 turns. This prominent twist transport in jet spire rapidly creates a newborn large-scale flux rope from the jet base to a remote site. As a result, the newborn large-scale flux rope erupts into the outer corona causing an Earth-directed bubble-shaped CME. In particular, two sets of distinct flare post-flare loops form in its source region in sequence, indicating this eruptive event couples with twice flare reconnection. This observation highlights a real pathway for jet-CME magnetic coupling and provides a new hint for the buildup of large-scale CME flux ropes.