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LINE-LOCKED OUTFLOWS FROM QUASARS

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Quasar surveys reveal a high fraction of kinematically coupled metal-rich narrow absorption-line (NAL) systems with a velocity difference that corresponds to the wavelength separation of the CIV (1548Å, 1550Å) doublet members. This phenomenon, termed line-locking, reflects on the role of radiation-pressure force in driving astrophysical outflows, but its implications for their physics have been largely overlooked. In this talk we present the conditions for line locking to occur, and find that driving forces other than radiation pressure force (e.g., drag forces, cosmic-rays) are likely negligible. Further, extreme fine-tuning of the properties of the line-locked kinematic systems seems to be implied, which challenges most theories for cloud and outflow formation with implications for quasar feedback. It is argued that quasars must have largely evacuated their gaseous environs for line-locking to operate. We explore the possibility that line-locked NAL systems are tracers of individual (unmixed) circumstellar envelopes, and that a detailed study of their composition and dust content can shed light on the physics of their progenitors over a wide range of redshifts. Pending theoretical challenges associated with line-locked systems will be highlighted, and implications for the general phenomenon of quasar outflows will be discussed.