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**Utilizing Active Single-Mode Fiber Injection for Speckle Nulling in Exoplanet Characterization** NIKITA KLIMOVICH, DIMITRI MAWET, GARRETH RUANE, WENHAO XUAN, DANIEL ECHEVERRI, MICHAEL RANDOLPH, JASON FUCIK, Caltech, JAMES WALLACE, Jet Propulsion Laboratory, JI WANG, Caltech, GAUTAM VASISHT, Jet Propulsion Laboratory, RICHARD DEKANY, Caltech, BERNARD MENNESSON, ELODIE CHOQUET, EUGENE SERABYN, Jet Propulsion Laboratory — High dispersion coronagraphy is on the critical path to the full characterization of Earth-like exoplanet atmospheres, but such measurements are still limited by the raw contrast between the remaining star speckle field and exoplanet. Using an adaptive optics system, the wave front of the starlight can be modified to create destructive interference at the planet location, reducing the background from the star further. We have demonstrated a new concept for speckle nulling via injecting the directly-imaged planet light into a single-mode fiber, linking a high-contrast adaptively-corrected coronagraph to a high-resolution spectrograph (diffraction-limited or not). The restrictions on the E-field that will couple into the single-mode fiber give the adaptive optics system additional degrees of freedom to suppress the speckle noise on top of destructive interference. Using this technique, we are able to show a significant improvement in starlight suppression at a given location.

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