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Abstract:

Pulsar scintillation has revealed discrete inverted arclets on the secondary spectra of some pulsars, suggesting the existence of plasma lenses whose properties are still poorly constrained, and whose astrophysical correspondence is unknown. Monitoring the time evolution of pulsar scintillation arclets is the best way to probe the properties of these plasma lenses. In the 2021 - 2022 observing season, we successfully detected inverse arclets and their variation in the secondary spectra of pulsars B1737+13 and B1508+55. The arclets are found to vary faster than what is predicted by the previously favored plasma lens model. We propose multiple observations of these two pulsars and one additional pulsar on subsequent days to monitor their arclets evolution. The results can help us figure out whether the arclets are stationary or transient, and measure the velocity of the arclets as well as their brightness evolution if they are stationary. These will provide crucial constraints on the nature of the plasma lenses and help uncover their astrophysical origin.