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The Radio Knots within SNR Cassiopeia A and Turbulence around Geminga TeV halo

The study on the dynamic evolution of young supernova remnants (SNRs) is an important way to understand the density structure of the progenitor's circumstellar medium. We have reported the acceleration or deceleration,

proper motion, and brightness changes of 260 compact radio features in the second-youngest known SNR Cas A at 5 GHz based on the Very Large Array data of five epochs from 1987 to 2004. The radio expansion center is located

at $\alpha(1950) = 23^{\text{h}}21^{\text{m}}9.7 \pm 0.29$, $\delta(1950) = +58^{\circ}32'25.2 \pm 2.2$. Three-quarters of the compact knots are decelerating; this suggests that there are significant density fluctuations in the stellar winds of the remnant's progenitor. We have verified that the acceleration or deceleration of compact knots is not related with the distribution of brightness. The brightening, fading, disappearing, or new appearing of compact radio features in Cas A suggests that the magnetic field in the remnant is changing rapidly.

Summary

Primary author: Dr LEI, Xianhuan (National Astronomical Observatory)

Presenter: Dr LEI, Xianhuan (National Astronomical Observatory)