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First measurement of a non-round photosphere with Stellar Intensity Interferometry: VERITAS observations of gamma Cassiopeia

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The VERITAS array consists of four Air Imaging Cherenkov Telescopes, measuring showers generated by extremely high-energy cosmic rays. During full-moon intervals, VERITAS is used for Stellar Intensity Interferometry (SII). This technique, pioneered by Hanbury Brown in the 1950s, probes the spatial distribution of intensity at the sub-milliarcsecond scale. Quite recently, groups around the world have been developing SII technology for future deployment, and a first round of measurements of stellar radii have been published in just the past year. In the early days, subatomic femtoscopy, based on Hanbury Brown's technique, measured only one-dimensional source radii (Rinv). With better statistics, extended phasespace coverage, and more complete detectors, femtoscopy has measured subatomic source shapes and orientations, proving much more insight on the evolution and dynamics of heavy ion collisions. I will present VERITAS-SII measurements of gamma Cassiopeia, a Be-type rapid rotator. With more complete baseline-vector coverage, we are able to measure not only the size of the photosphere, but its equatorial bulge and orientation of angular momentum. Fitting this data with a stellar model reveals that this star rotates at 99.6% of its breakup velocity.

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