1. Abstract

The research conducted here will test the viability of wireless intensity interferometry as a method for ground-based astronomical observation. Some key considerations when observing with a wireless intensity interferometer include the performance limitations imposed by the orientation of the telescopes, the baseline, the position of the object in the sky, and the speed of the detectors. These factors affect the time delay of the correlated photons received by each telescope and its rate of change with time. However, careful monitoring of this time delay should allow for reconstruction of the peak in the intensity correlation observed at two stations. Calculations regarding these factors suggest that if the target is near the local meridian and the two telescopes are aligned North-South, minimal work is required in order to properly align the data streams. The correlation peak moves slowest through the data stream at this point, and then speeds up with different telescope orientation and a target at a further distance from the meridian. This simplest case allows for longer integration time, yielding higher signal-to-noise. This information is useful for routine, productive use of an on-campus, two-station intensity interferometer. Such an instrument will serve as the prototype of a large, multi-aperture intensity interferometer, and may ultimately demonstrate this technique as a way of improving the resolution that ground-based optical interferometry can achieve. Simulation work is currently being conducted to combine the above work with interferometry theory regarding what the data would look like in the end, and what one can learn from it. One can verify that the count rates that are obtained from an exposure would result in a suitable signal-to-noise ratio (SNR). Once this is met, and after performing the Fourier analysis on the data set as a whole, one can construct an intensity plot that yields stellar parameters such as diameter, in the case of a single star, or distance separation in the case of a multiple-star system. The result of all of this, then, is an end-to-end simulation of the wireless intensity interferometry process.