



UNIVERSITY OF MIAMI
COLLEGE of
ARTS & SCIENCES

Miami Physics Conference 2023

Date: Dec 13-19, 2023
Location: LagoMar Resort
Affiliation: Flatiron Institute and NYU

Ken Van Tilburg

Extended-Path Intensity Correlation

Abstract

I will introduce a conceptually new astronomical technique---extended-path intensity correlation (EPIC)---and discuss its scientific applications.

EPIC is a variant of intensity interferometry wherein an optical-path modification creates a path extension in the two-photon interference amplitude. This alteration generates interference fringes for widely separated sources, allowing maximum source separations parametrically larger than the angular resolution. Augmented with advances in single-photon detectors and spectroscopic gratings, EPIC would enable ground-based astrometry at microarcsecond-level precision in a field of view as large as several arcseconds. EPIC has the potential to revolutionize astrophysical and cosmological observations requiring high-precision differential astrometry on sources of high surface brightness.

I will lay out the theory, technical requirements, and scientific potential of EPIC, and discuss the scientific potential. Promising applications include astrometric microlensing of stars and quasar images, binary-orbit characterization, exoplanet detection, Galactic acceleration measurements, calibration of the cosmic distance ladder, all at unprecedented relative astrometric precision.