

Title: Intensity Correlations for Stars

Keywords: Intensity Correlations, quantum optics, astrophysics

Scientific description:

The pioneering experiments of intensity correlations by Hanbury-Brown and Twiss more than 50 years ago not only allowed to measure the angular diameter of many bright stars, but it also motivated Roy Glauber to develop his quantum formalism of photon statistics. The advent of direct optical interferences of light collected by different telescopes, with superior performances in terms of signal to noise ratio and reduced required observation time put an end to intensity correlation imaging for astrophysics. State of the art optical interference imaging is however limited by accessible baselines and restrictions due to atmospheric fluctuations limiting the required stability for such observations. In our group we have revived HBT technique for astrophysical imaging using modern photon counting techniques to perform quantum optics measurements and probe quantum systems in astrophysics. One target will be a quantum degenerate Fermi gaz of electrons (a white dwarf) whose angular diameter is out of reach with present optical imaging techniques. This experiment will take place using the Keck and CFHT telescope in Hawaii.

The goal of this internship is to develop a multiplexing scheme, allowing for the required increase in sensitivity of this quantum optics tool in astrophysics.



Techniques/methods in use: optics, telescopes

Applicant skills: Experiments in optics

Industrial partnership: N

Internship supervisor(s) (name, email, phone, ...): Robin Kaiser , robin.kaiser@univ-cotedazur.fr

Internship location: Institut de Physique de Nice, Nice

Possibility for a Doctoral thesis: Y (funding in evaluation)