

Latest advances in precise optics resulted in successful developments in quantum microscopy and quantum lithography. Presently, it is possible, among others, to increase the angular resolution in imaging above so called diffraction limit, which is an impassable for classic optics. But it requires a special preparation of the object to be imaged.

The idea of Quantum Telescopes (QT) is aimed at imaging extended astronomical objects of interest at resolution higher, than classic optics allows – in UV, visual and infrared bands. The idea is based on parametric amplification of the signal: from one photon inbounding from Space a few its almost identical clones are produced. Using such cloud of photons-copies it is possible to read the information about the direction where the original photon came from more precisely, than it would be possible using only the original spaceborne photon. Parametric signal amplification has a large intrinsic noise – an effect of laws of quantum mechanics. We already managed to work out a quantumoptical model of this kind of noise and we discovered, that it is very irregular and has a tendency to form into clumps. Those clumps are very similar to the cloud of clones.

The main goal of the project is to comprehensively investigate the influence of such noise on the usability of parametric light signal amplification in astronomy. Specifically we are going to develop a method of signal analysis which would help to eliminate the influence of the noise on QT efficiency. The most important task is efficient distinguishing the signal from noise clumps.