

This manuscript investigates the effects of dynamic aberrations created by the space environment changes on the telescope performance of a space gravitational wave detector system. As is known, the telescope is an important element of space gravitational wave detector systems such as LISA or Taiji. Gravitational wave signals are detected by measuring laser light beams' extremely small phase changes during propagation in space. The knowledge of the coupling relationship between wave aberrations and phase is crucial for improving the measurement accuracy of gravitational wave detectors. The authors study theoretically telescope wave-front aberrations and optical path stability in those systems. The theoretical model for the phase demodulation of two-beam interference is described, and the aberrations are analyzed based on the Zernike polynomial. The influence of wave-front aberrations (of lower orders) on the phase signal is discussed with numerical examples, and the relationship between the dynamic aberrations of the gravitational wave telescope and the laser phase demodulation on the QPD is illustrated numerically. Authors show that different aberrations (i.e., spherical aberration, defocusing) affect the gravitational waves signal, so the effect must be considered in telescope design.

The paper's findings are interesting and may be beneficial to the practical engineering of the gravitational waves telescopes used for instance in LISA or Taiji, etc.

I think the paper can be published in Optics. Yet, some minor revisions must be made:

1-The cited authors in lines 50 and 51 (page 2) are inconsistent with those in the bibliography list.

2-Line 71: 'At the end of the chapter ...' must be changed to 'At the end of the manuscript'

3-Line 100: the uppercase letter 'Z' must be a minuscule one 'z'.

4-Please revise the typo errors [0] and [0-0] in the whole text.

5-The sentence on page 10 (lines 247-248) "If readers are interested in this, they can contact me for discussion, and this article focuses on the analysis of aberration and stability, so this part will not be analyzed in detail in this paper “ must be **reformulated or eliminated**.

6-In the references list (page 12), the presentation of references is not uniform: in some references, author names are given with capital letters (see Refs. 14, 15, 17, 18), so there are not consistent with others: