Review Paper

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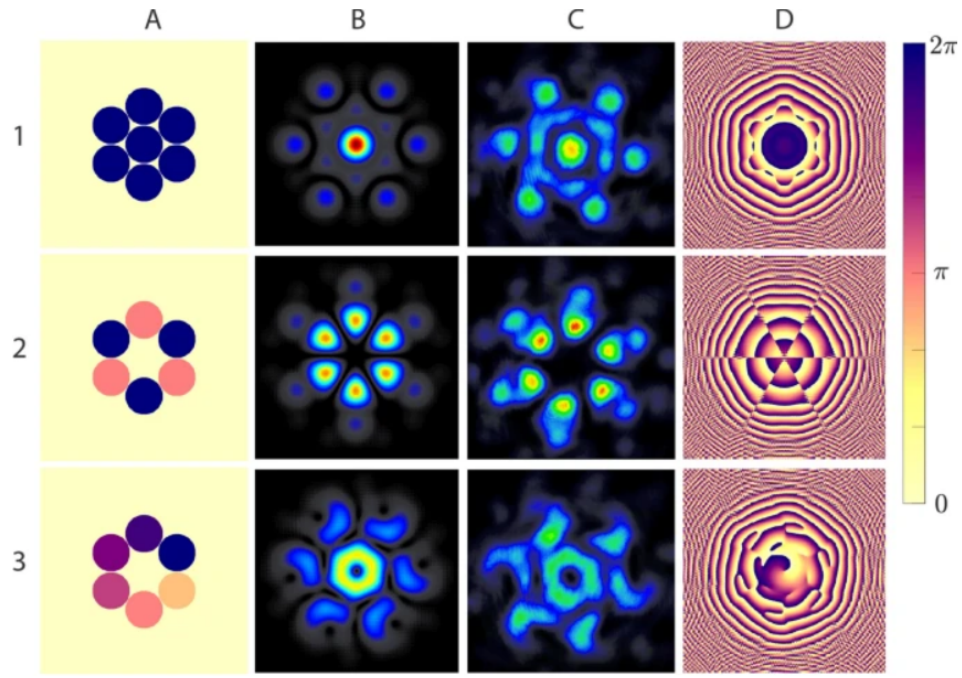
ABSTRACT

Multiple topics from photonics are used in the paper, Integrated structured light architectures. This paper will take a look at one specific topic that is used in the experimental set up.

INTRODUCTION

Photonics allows for the manipulation of light. It has led towards many technological advancements. They help with communications, displays, and even for some medical purposes. Optical modulation of these light waves allow the ability of building complex structures with interesting results. Optical modulation has several components that can affect the output of the wave. Optical modulation can deal with the phase, amplitude, polarization and timing. Together these individual properties can lead to intricate patterns just like in the experiment. When the beam is split each different variation will lead to different results as in figure 1 where the phases and amplitudes vary.

Figure 1



METHODS

In this analysis we will mostly see how some of the different modulations are executed. In the experiment the once the beam is separated into smaller beams each one of these beams may be either on or off. This is achieved through amplitude modulation. In this type of modulation the magnitude of the electric field is changed and as a result the intensity of the beam is also changed. Since the only two options in this experiment are on or off for amplitude this leads to the reasoning that this is achieved with amplitude-shift keying (ASK). In ASK a bit of 1 is used to denote the higher electric field and a bit of 0 is used for the lower electric field. For our case the bit 1 should be used for when the electric field is allowed to pass through and a bit of 0 for when it's not allowed to go through. This encoding is done by using direct modulation. Direct modulation is done by passing a DC current through a photodiode and allowing the signal to be amplified. This process is done for each separated beam.

Phase modulation is also done in this experiment when the beam is separated into different beams. The phase modulation controls each single beams' relative phase to one another. These controlled phases allow the wave to have different types of interferences when different selected phases are chosen. This process is done through phase shifting keying (PSK). Each separated beam can have a selected phase from 0 to 2π. This process is done by direct modulation. In this setup the beams pass through a photodiode and this causes phase change because of Kramers–Kronig relations.

RESULTS AND INTERPRETATION

These results allow us to see that phase and amplification modulation play a big role in the experiment. Not having control over these parameters would lead to having individual beams that can't have a final controlled interference.

CONCLUSIONS

With these results it can be seen how phase and amplitude modulation are executed using direct modulation. These are just some examples of modulations and methods that can achieve a similar effect. Other types of modulation include frequency, polarization and timing.

REFERENCES

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