Hodge experiment (continued) with opaque strips and about the Afshar Experiment

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Abstract

Opaque strips in coherent light shows diffraction effects. The Hodge Experiment of the Scalar Theory of Everything (STOE) model is the Fraunhofer pattern from a first mask with a slit impinges on a second mask. The Hodge Experiment is extended to model a second mask of an opaque strip. The STOE photon model suggests the wires in the Afshar Experiment cause small interference that redirects a small percentage of the photons away from the detectors. This could help interpret Afshar's "V^*" (non-perturbative measurement parameter) (Afshar et al.(2007) http://www.arxiv.org/abs/quant-ph/0702188). The STOE is consistent with actual light screen patterns from opaque strips.

keywords: diffraction, interference, light, Afshar Experiment, STOE, TOE.

1 INTRODUCTION

The Scalar Theory of Everything (STOE) model suggested a photon model of light (Hodge 2012). The model predicted a unique diffraction pattern of light on a screen for a varying light intensity across a slit (Hodge 2015b). A computer toy simulation was developed. The Hodge Experiment was developed to explore the STOE prediction. The Hodge Experiment uses a diffraction pattern from a first mask slit to form a coherent light intensity pattern on a second mask. Moving the slit in the second mask allowed differing light intensity profiles. The effect of edges was also explored (Hodge 2015a). The Hodge Experiment rejects wave models of light.

The STOE model posits photons cause waves in the plenum that reflect off other matter such as atoms in surfaces. These reflected plenum waves then direct the photon. Therefore, added surfaces such as detectors in the experiment changes the photon's path rather than the Quantum Mechanics model wherein the added surface destroys path knowledge ("collapses of the wave function", etc.).

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An extension of the Hodge Experiment using a transparent mask suggested a mechanism of interference and rejected wave models of light (Hodge 2017). This experiment suggested the presence of the slits or gaps in the mask changed the reflected plenum that produced the interference pattern from the second mask on the diffraction pattern of the first mask.

Afshar (2005); Afshar et al. (2007) conducted a double slit experiment in which wires were placed at interference minima. The model of the experiment suggested the which-way information had been detected in a wave experiment. Therefore, particle and wave phenomena were detected in the same experiment that rejected complementarity. Several authors suggested the Afshar experiment did not reject complementarity. Unruh (2004) suggested that because an obstacle in the pattern produced a change effect in the light which made the questionable assumption that light in detector 1 MUST have come from path 1. Steuernagel (2007) criticizes the inference that the interference pattern is present after the wires are placed in the experiment. However, Afshar noted a small decline in total intensity that was attributed to the wires blocking photons or scattering photons by reflection.

This Paper continues the Hodge Experiment to explore the STOE applicability to opaque strips as the second mask. Section 2 describes the experiment. The Discussion and Conclusion are in section 3.

2 Experiment

The experimental configuration was the same as in Hodge (2016b) except the second mask was an opaque strip.

The following figures show a photograph of the screen image and the result of the toy computer simulation for the experiment. The photographs have been converted to gray scale for printing.

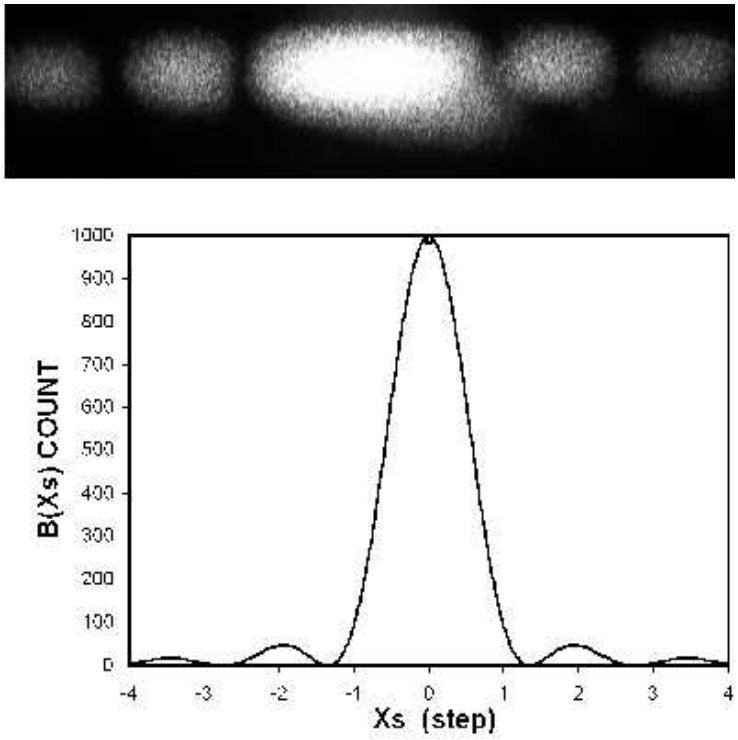

Figure 1: The image of the first mask on the second mask. It is the Fraunhofer diffraction pattern as established previously (Hodge 2016b).

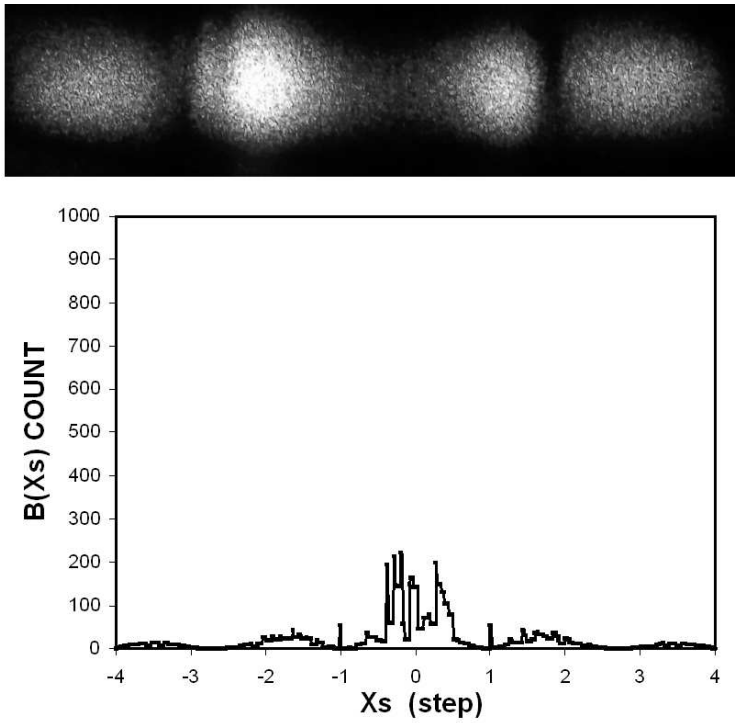

Figure 2: Opaque strip in the middle of the primary peak. The overall intensity of light is considerably smaller. Interference peaks are present as shown in the simulation and the image. The photograph shows them poorly. The large spikes in the simulation indicate the interference fringes.

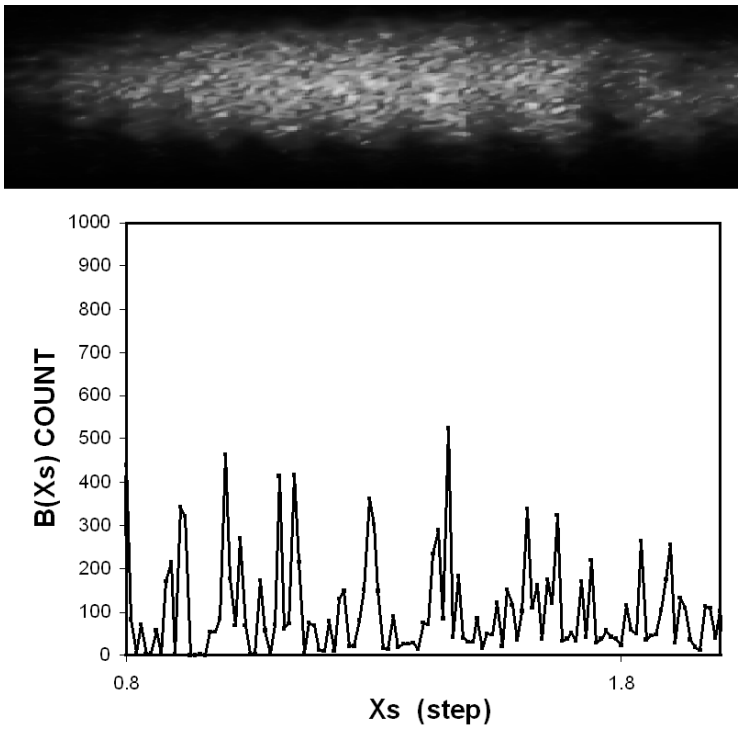

Figure 3: A closer view of one of the secondary peaks showing the interference fringes.

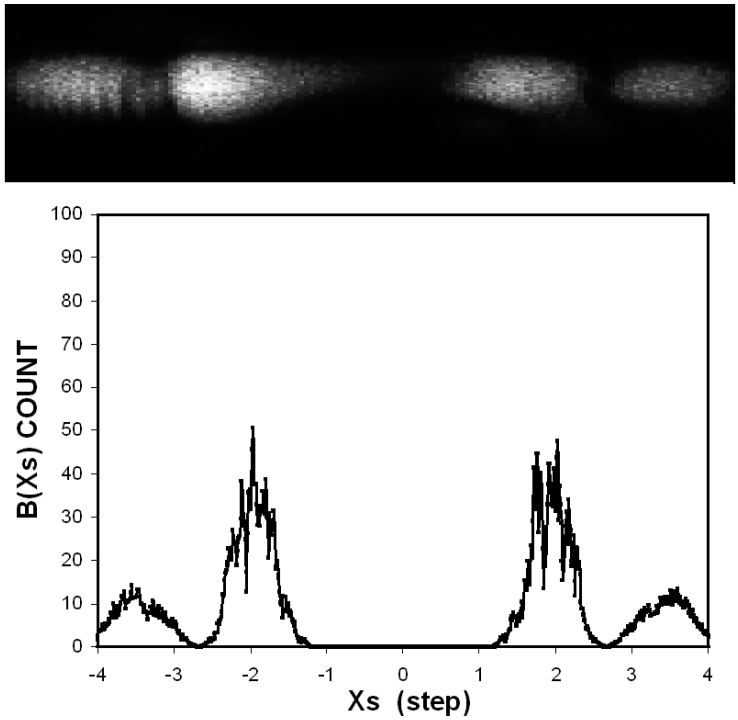

Figure 4: Opaque strip from one first minima to the first minima on the other side. Light intensity is considerably reduced which allows the interference peaks to be photographed. Note the $B(Xs)$ is also much lower.

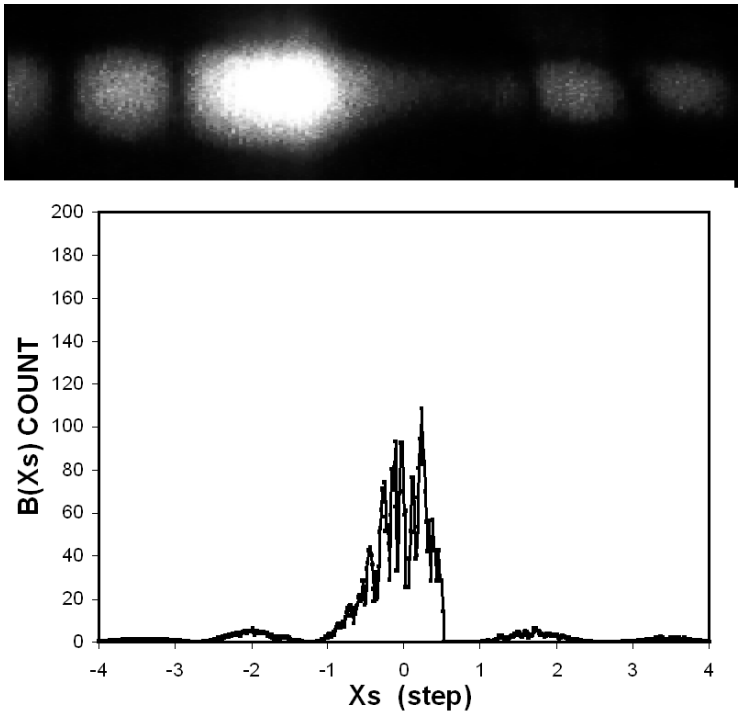

Figure 5: Opaque strip from center to first minima. This is compared to the edge effects with the edge in the center and with the edge at the first minima of Hodge (2015a).

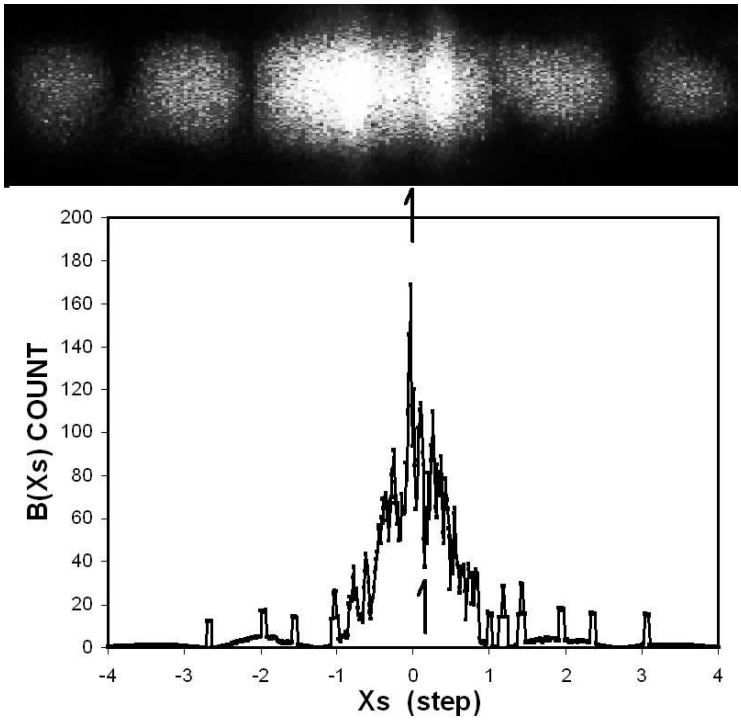

Figure 6: Wire (0.5 mm in diameter and 1 m from the first mask) near the center of the peak. The arrows indicate the position of the wire. An interference pattern was produced in the central and first two secondary peaks in both the image and the simulation.

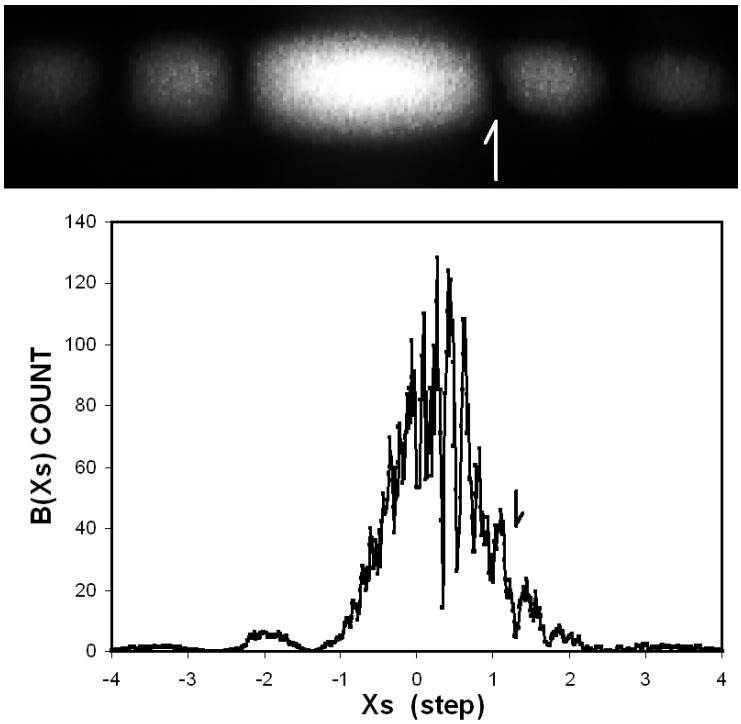

Figure 7: Wire at the first minima. The second mask position was 1 m from the first mask. A slight discernable interference effect was noted. However, the total number of photons in the simulation was 16 of 13031 photons less. The Afshar experiment was examined in Hodge (2012) by examining the angle the photons were traveling at the screen. There were 10 photons that should have been going to the left of the image but were going right. There were 466 photons that should have been going to the right of the image but were going left.

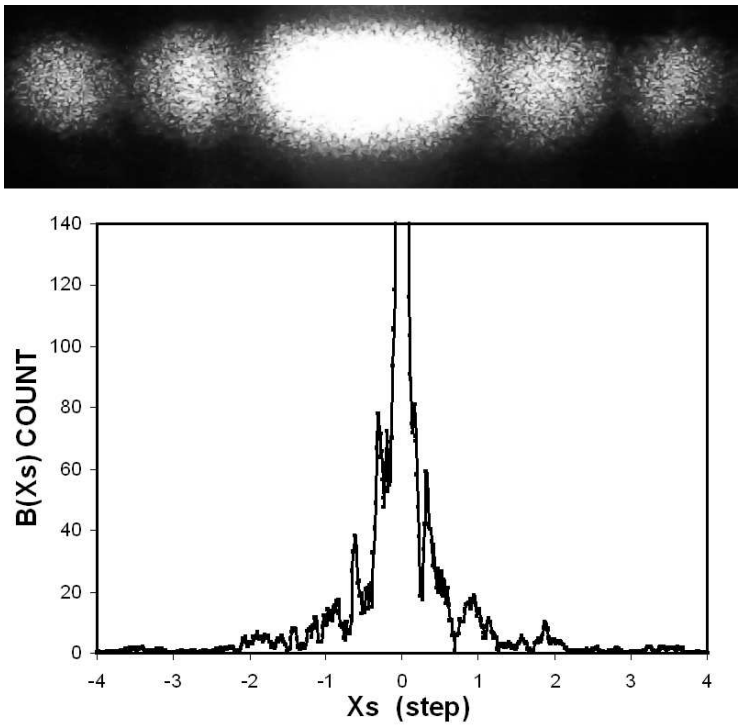

Figure 8: Wire at the six minima points of the image. This image was from the second mask placed at 3 m from the first mask. That is the wire profile was less than in Fig. 7. The simulation also considered a smaller profile of the wires. There may be an interference pattern present in the image, but the data were inconclusive. The total number of photons in the simulation was 66 of 13031 photons less and 611 photons changing direction. If all the blocked and misdirected photons were not counted by the detectors, this is consistent with the light intensity decrease noted by Afshar (2005).

3 Discussion and Conclusion

If an interference pattern is present in Fig. 7 caused by the edges of the wire as suggested by Hodge (2017), then the suggestion of Afshar (2005) that all the photons past the wires go to where they were traveling before the wires may be questioned. However, the deviated number would be small relative to the experiment. This could help interpret Afshar's "V^*" (non-perturbative measurement parameter) (Afshar et al. 2007). The combination of blocked and redirected photons in the simulation is approximately the level of missing intensity noted by Afshar.

The lack of obvious interference in Fig. 8 suggests a more sensitive equipment such as a photon counter may be needed.

The STOE photon model and the toy simulation program continue to describe more light experiments. The STOE photon model suggests the wires in the Afshar Experiment cause small interference that redirects a small percentage of the photons away from the detectors. This could help interpret Afshar's "V^*" parameter. The STOE is consistent with actual light screen patterns from opaque strips.

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