



# Laser Guidance Countermeasures - Color



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## Abstract

The purpose of this experiment was to analyze the effectiveness of a common item, spray paint, to maximize the scattering of the reflected beam.

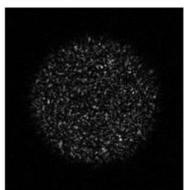
## Background

With black being an ideal body for absorbing and radiating away laser light, changing the colors of the surface alters the intensity of the reflected ray, which is a measure of scattering.

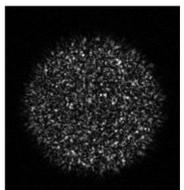
## Images



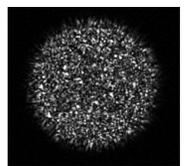
Black Paint with 4.0 Filter



Grey Paint with 4.0 Filter



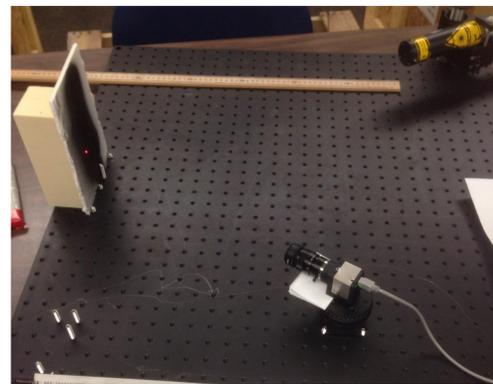
Red Paint with 4.0 Filter



White Paint with 4.0 Filter

## Methods

Setting the laser 58.5 cm away from the surface at an angle of 60.54 degrees from the normal of the surface, we captured the reflected ray with a Thorlab CCD camera.



### MATLAB

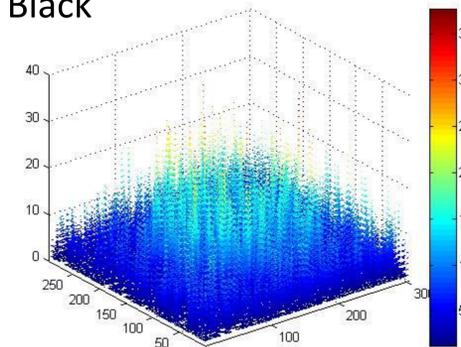
Images were loaded into MATLAB and read using the `Imread` function.

Once the image was converted to data, the points were plotted on a 3D contour plot

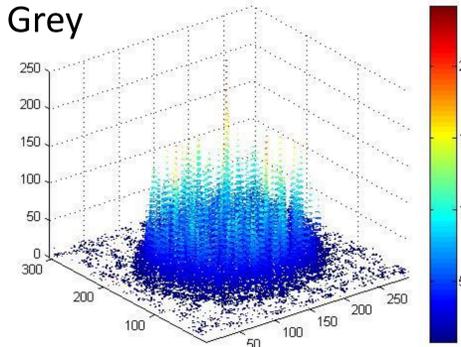
Each color corresponds to an intensity of light, blue being low intensity and red high intensity.

## Results

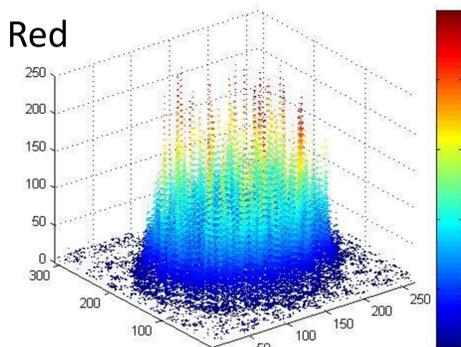
Black



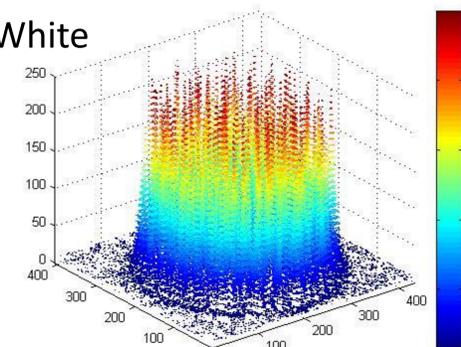
Grey



Red



White



## Conclusion

Looking at the graphs and MATLAB output it is clear that the black, matte paint is the most effective of the colors at scattering the incident beam.

In an urban environment, black matte paint provides the best countermeasure of easily attainable resources.

## References

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- Kasap, S. O. (2001). *Optoelectronics and photonics: principles and practices*. Upper Saddle River, NJ: Prentice Hall.
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- Nielsen, P. E. (1994). *Effects of directed energy weapons*. Washington, D.C.: NDU Press.

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