

**EFFECT OF DIFFERENT COLORED BACKGROUND LIGHTING  
ON LED GLARE PERCEPTION**

by

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A Thesis Submitted to the Graduate  
Faculty of Rensselaer Polytechnic Institute  
in Partial Fulfillment of the  
Requirements for the degree of  
MASTER OF SCIENCE  
Major Subject: LIGHTING

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July 2011

(For Graduation August 2011)

## ABSTRACT

In the past decade, there has been increased interest in energy efficient lighting, as energy resources become higher in demand. Street lighting and outdoor lighting are areas that are rapidly changing from the incumbent high pressure sodium (HPS) to newer technologies such as light-emitting diode (LED) or induction type lamps. There is evidence that certain populations believe LED streetlights and area lights to be more glary than HPS luminaires. There are a number of differences between new and traditional light sources besides efficiency: spectral power distribution (SPD), luminance levels, illuminance levels, beam distribution and number of sources needed to achieve intended light levels. Many field studies and laboratory studies have shown a relationship between glare and spectral power distribution; with most studies suggesting that sources more weighted in short wavelengths have increased likelihood of discomfort glare.

The purpose of this thesis is to investigate the relationship between the spectral power distribution (SPD) of the luminous field surrounding white light LED arrays (as in typical LED outdoor area lights), and discomfort glare. A relationship between background luminous field SPD and discomfort glare might offer some possibilities for mediation of glare in outdoor area lighting installations, street lighting and perhaps transportation. In the laboratory, white LED arrays with different background luminous field SPDs were presented to subjects and responses were collected using a subjective glare rating scale. The study identified a significant effect of both background luminous field SPD and of overall illuminance level (in the range 4 lx to 12 lx) on subjective perceptions of glare, but there was no significant interaction between background luminous field SPD and overall illuminance levels. Some possible applications related to the findings are discussed.