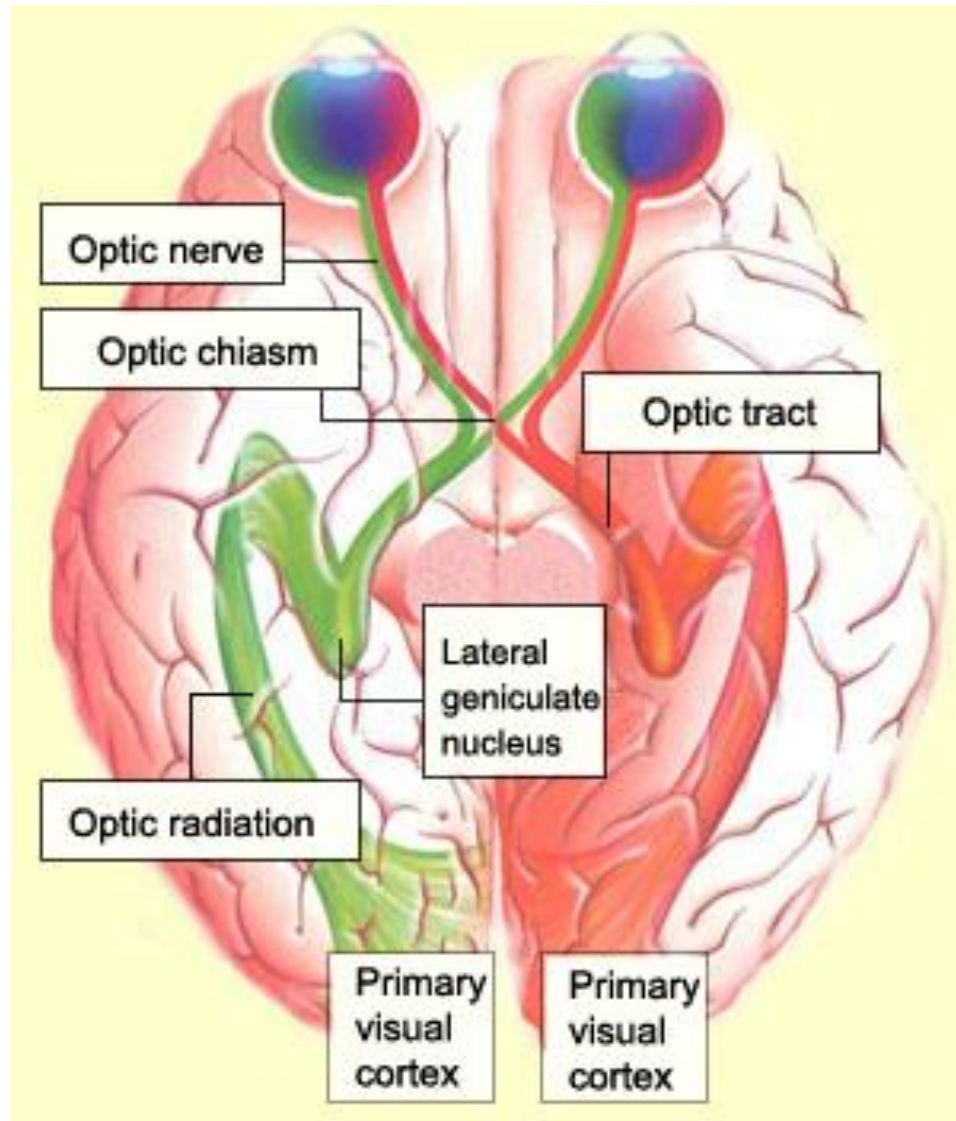


Soft Lights Foundation

The Hazards of Light Emitting Diode Products

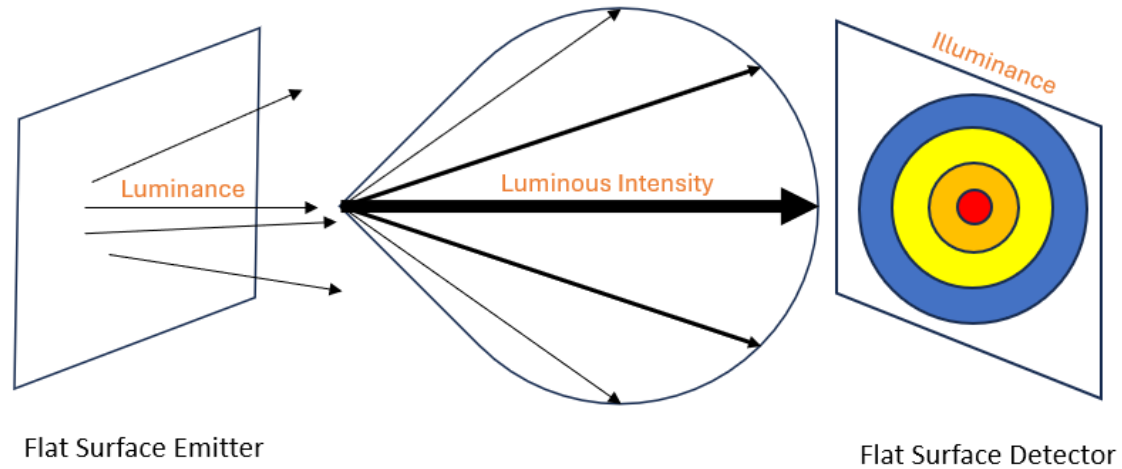
Visible Electromagnetic Radiation is Converted to Electrical Signals



Biological Expectations of Light:

- Sunlight during the day
- Starlight and moonlight during the night
- Spatially uniform
- Continuous
- Reflected from an object
- Low intensity

Flat Surface Emitter



A flat surface emitter creates a Lambertian spatial profile.

Luminance Examples

LED car headlight = $70,000,000 \text{ cd/m}^2$

LED street light = $100,000 \text{ cd/m}^2$

Maximum human comfort = 300 cd/m^2

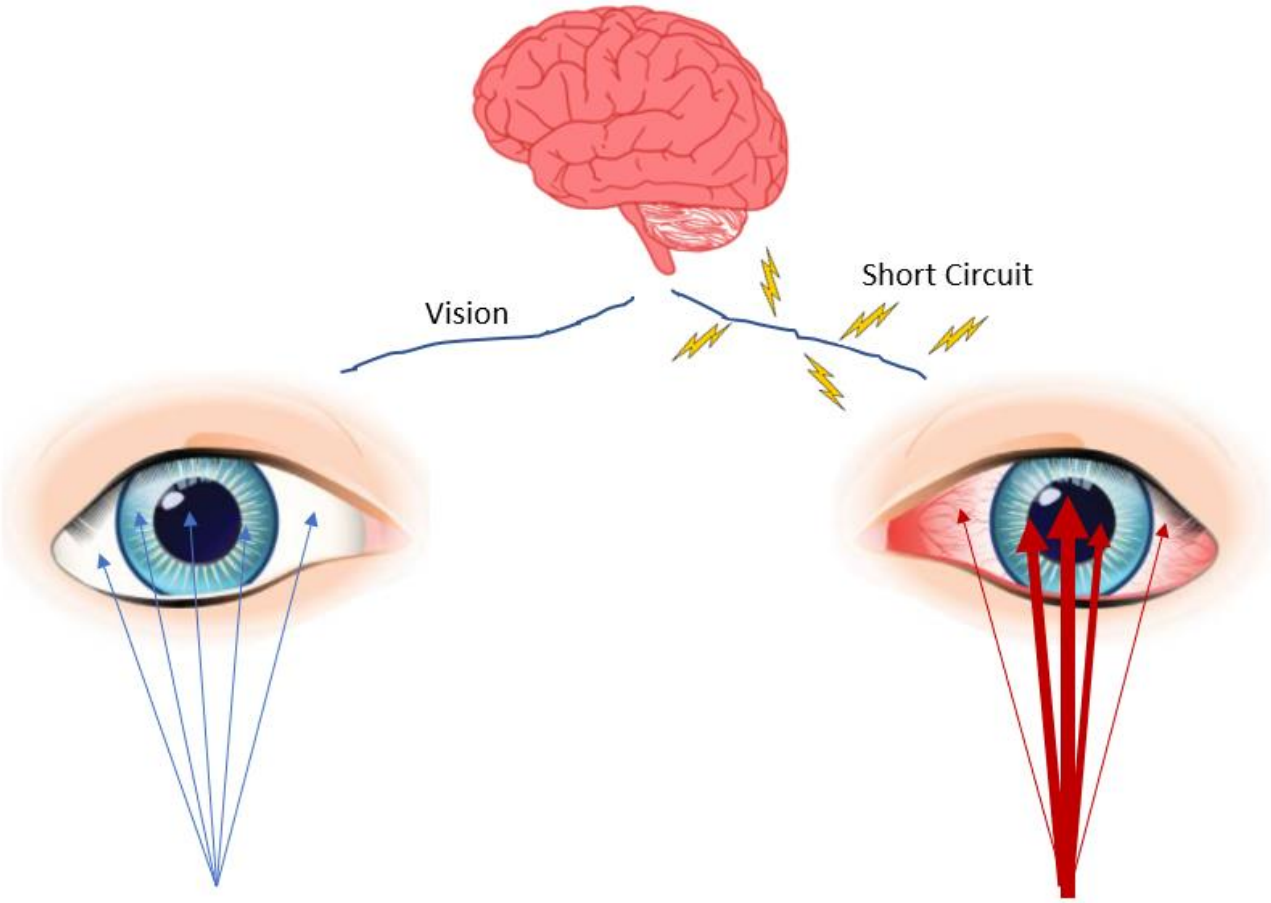
Roadway surface at night = 0.3 cd/m^2

Luminance: candela/m^2

Luminous Intensity: candela

Illuminance: lumens/m^2 (lux)

Curved vs. Flat Surface



Flat Surface LED Visible Radiation:

- Extreme luminance
- Spatially non-uniform
- Directed energy beam
- Blue wavelength
- Square wave flicker

Uniform Luminous Intensity

Non-uniform Luminous Intensity



Adverse Health Impacts of LED Visible Radiation

Neurological

- Seizure
- Migraine
- Anxiety
- Panic Attack
- Nausea
- Brain Fog

Optical

- Eye pain
- Permanent eye cell damage
- Macular degeneration

Circadian Rhythm

- Loss of sleep
- Diabetes
- Heart disease
- Prostate cancer
- Breast cancer
- Thyroid cancer
- Mood disorders
- Premature birth
- Early mortality
- Autism

Personal Stories of Harm

- “I have been made ill from LEDs since 2007. It is more than a sensitivity; it is a disability. I am disabled by my environment, like so many others, and excluded from society.”
- “LED-triggered seizures have left me with broken teeth, bruises and excruciating pain that lingers for days.”
- “I immediately developed pain behind my left eye, became pale and nauseated and rapidly developed a migraine.”
- “Every day I would come to work, and these unnatural lights would shine into my eyes, terrorizing me.”
- “Strobing LED lights are becoming so common on utility vehicles, and they actually cause me to go into a completely overloaded state where I can’t think straight.”
- “Since these LED headlights have been allowed, my life has been destroyed and my world turned upside down.”

Lack of Regulations

- 1968 Radiation Control for Health and Safety Act: 21 U.S.C. 360hh – 360ss
- No FDA performance standards
- No restrictions on luminance, dispersion characteristics, spatial non-uniformity, spectral power distribution, or square wave flicker
- No regulations by any federal agency, including FDA, DOE, DOT, NHTSA, FMCSA, OSHA, CPSC, Access Board, FAA, or EPA
- No regulations for LED vehicle headlights, LED streetlights, LED General Service Lamps, LED strobe lights, LED indicator lights in appliances, LED flashlights, LED bicycle lights, etc.
- Government and industry have ignored the luminance metric.
- Government is not collecting the reports of harm from LED exposures.
- DOE makes two false claims: 1) LED light and incandescent light have the same characteristics; 2) There are no adverse health impacts from LED visible radiation.
- LEDs are not energy-efficient, just low-quality visible radiation.

Soft Lights Foundation Regulatory Efforts

June 12, 2022 – Petition FDA-2022-P-1151 to publish performance standards for LED products as mandated by 21 U.S.C. 360ii.

December 24, 2022 – Petition to DOE to Repeal 45 Lumen/watt Final Rule ignored. DOE Office of Inspector General case 32-0319-C.

January 22, 2023 – Petition FDA-2023-P-0233 for LED flashing lights.

September 7, 2023 – Petition FDA-2023-P-3828 for LED headlights.

September 11, 2023 – Petition FDA-2023-P-3879 for LED street lights.

September 27, 2023 – NHTSA Request for Interpretation Letter - LED Headlight authorization.

November 26, 2023 – Petition to FTC to require luminance metric on LED product packaging.

Recommendations

- FDA must publish performance standards for LED products.
- Restrictions on Luminance.
- Restrict blue wavelength light.
- Protect the starlight, moonlight, and absence of sunlight as fundamental resources.
- Artificial light is a pollutant.
- Protect those who are most sensitive to LED visible radiation.
- LED Streetlights are unnecessary and harmful.
- Prohibit LED flashing lights.



Good



Best