

January 4, 2022

**BY EMAIL**

Frederick S. James, Deputy Assistant Secretary of Labor  
Occupational Safety and Health Administration  
Frederick.James.S@dol.gov@dol.gov

**Re: Regulation of LED Electromagnetic Radiation**

Dear Frederick James,

Light Emitting Diode light beams have avoided regulation. As shown in Figure 1, both LEDs and Lasers emit a hazardous light beam, but only Lasers are regulated by the government. LEDs have avoided being regulated.

Regulatory Meaning of Light and Illumination

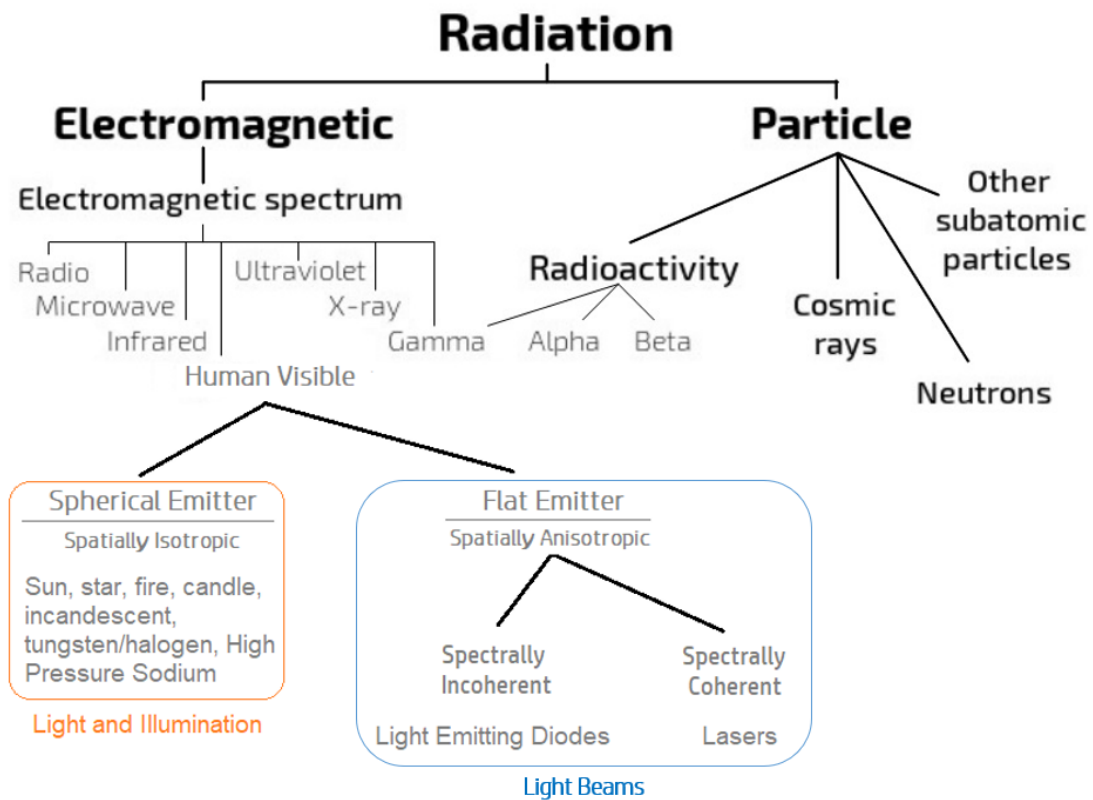


Figure 1 - Radiation Types

As shown in Figure 2, a spherical emitter sends light in all directions in space. Because of the curvature of the emitter, the light rays do not overlap, and the radiation is spatially, spectrally, and temporally uniform. A flat surface emitter, such as an LED, sends light only in the forward direction. The light rays are confined to an 'escape angle' which is determined by the physical characteristics of the chip. There are thus overlapping rays, with the most overlap being in the center of the chip, and the least overlap being on the edges. The result is that every point in space has different spatial, spectral, and temporal properties. This non-uniform radiation profile is not suitable for illumination and not compatible with the human nervous system. An energy efficiency comparison between an incandescent or High-Pressure Sodium and an LED cannot be made.

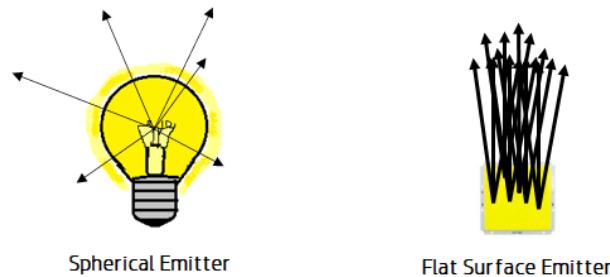


Figure 2 - Spherical vs. Flat Surface Emitter

Figure 3 shows the uniform light from candles, incandescent and High-Pressure Sodium versus the non-uniform light beam from an LED. The intense peak of energy will cause eye damage and will overload the nerve signals to the brain because the information is not uniform.

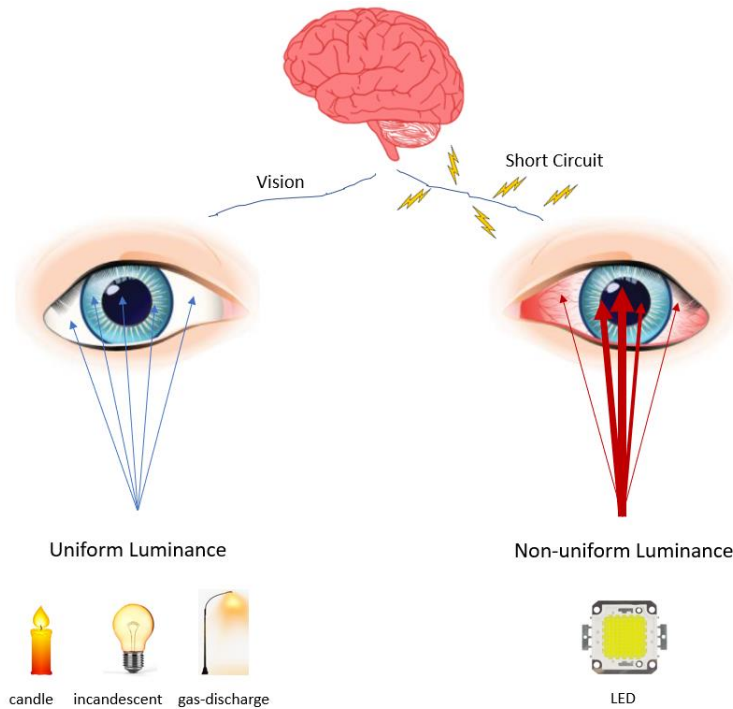
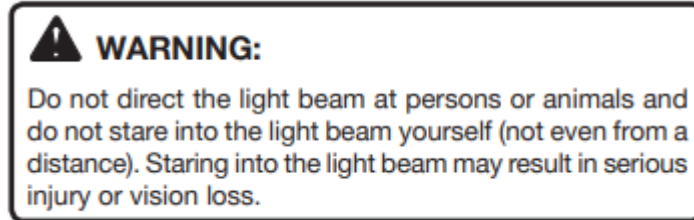


Figure 3 - Spatially Uniform v. Non-Uniform Radiation

As an example of how dangerous LED light beams are, the operator’s manual for the Ryobi P705 Flashlight includes the following: “WARNING: Do not direct the light beam at persons or animals and do not stare into the beam yourself (not even from a distance) Staring into the light beam may result in serious injury or vision loss.”



As another example, consider this warning shown in Figure 4 from the company Gear Light.

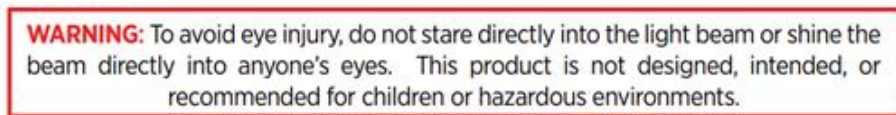


Figure 4 - LED Flashlight

Clearly neither flashlight can be safely used in a dark environment, as there is no feasible way to protect every approaching person or animal from being hit in the eye with the light beam. The warnings also refer to children, who along with infants are an identified high-risk population vulnerable to LED-exposure harm. Babies often lack an adult’s automatic, self-protective aversion response to bright or intense light, and will stare directly at the source.

Another area of danger is LED flashing lights which turn on and off instantly and have a dangerous peak radiance. There are many LED flashing radiation devices already being used in the workplace that will trigger seizures, cause migraines, and interfere with human nerve functioning. Here are some video examples:

Utility Truck: <https://youtu.be/ma0hGwHivO4>

Rectangular Rapid Flashing Beacon: <https://youtu.be/KBltx0Argag>

Strobe Light Bars: <https://youtu.be/7DYg6ZrW2Xg>

Appliances such as dishwashers, microwave ovens, washing machines, and refrigerators now use LEDs which are painful and dangerous. Figure 5 shows how employees are dealing with the dangerous LED indicator lights by taping over them.



Figure 5 - Washing Machine

The result of exposure to LED radiation is immediate sickness in the form of headaches, nausea, eye pain, loss of balance, migraines, panic response, altered vision, epileptic seizures, disorientation, and other neurological disturbances. Each of these symptoms is being verifiably reported by an increasing number of individuals and constitute medical evidence of LED-induced harm. LED visible radiation exposure is causing catastrophic physical harm, subjecting at-risk individuals to illness and injury, and plunging formerly healthy, independent people into crisis levels of stress, hopelessness, psychological trauma, and persistent thoughts of suicide.

LED radiation is discriminatory because it interferes with human nerves and disrupts major life functions such as seeing, thinking, and concentrating for people with disabilities, such as those with epilepsy, autism, PTSD, migraines, bipolar disorder, and others. LED radiation prevents safe access to public services such as roads, sidewalks, and government facilities. Use of LED radiation devices violates the federal Americans with Disabilities Act.

To protect the eyes, nervous system, and safety of workers and to ensure that employers do not create a discriminatory environment, OSHA must act in 2022 to set safety standards for maximum luminance, absolute spectral power distribution, flicker, and flash rate for LED devices in the workplace.

Sincerely,

*Mark Baker*

Mark Baker  
President  
Soft Lights Foundation  
[www.softlights.org](http://www.softlights.org)  
[mbaker@softlights.org](mailto:mbaker@softlights.org)  
9450 SW Gemini Drive PMB 44671  
Beaverton, OR 97008