

November 26, 2021

**BY EMAIL**

Takuya Mitsueda, CEO  
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**Re: Spatially Anisotropic Visible-Radiation Devices**

Dear Takua Mitsueda,

English Common Law dating back to 1663 states that a property owner has an easement to allow *light* to enter their property.<sup>1</sup> The word *light* referred to sunlight and starlight that could be seen by human eyes. We now know that human-visible light is the set of frequencies between approximately 400nm and 700nm on the electromagnetic spectrum. For regulatory purposes, *light* is spatially isotropic, meaning that the shape of the radiation is the same in all spherical directions.

Biological systems have a long history of evolution with *light*. The substance emitted by the sun, stars, fire, candles, and fireflies is *light* and is a fundamental component of biological life. Humans use their visual receptors to see objects using reflected light, the different wavelengths of light provide color information, and *light* controls circadian rhythms. *Light is spatially isotropic radiation in the human visible portion of the electromagnetic spectrum.*

Light Emitting Diodes are misnamed because they emit visible radiation, but not light. LEDs should more properly be named Visible Radiation Emitting Devices or VREDs. The substance emitted by LEDs is spatially anisotropic visible radiation. Because the substance emitted by LEDs is not light and is directed-energy radiation, this substance interferes with the nervous system and can cause eye damage, pain, epileptic seizures, migraines, psychiatric trauma, and thoughts of suicide.

We wish to alert DTRIC Insurance to liability issues related to the use of LED radiation devices in vehicles such as LED headlights. Figure 1 is a diagram that shows that *light* is spatially isotropic radiation in the human visible portion of the electromagnetic spectrum and that the radiation emitted by LEDs, while visible, is not *light*.

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<sup>1</sup> <https://www.britannica.com/topic/ancient-lights>

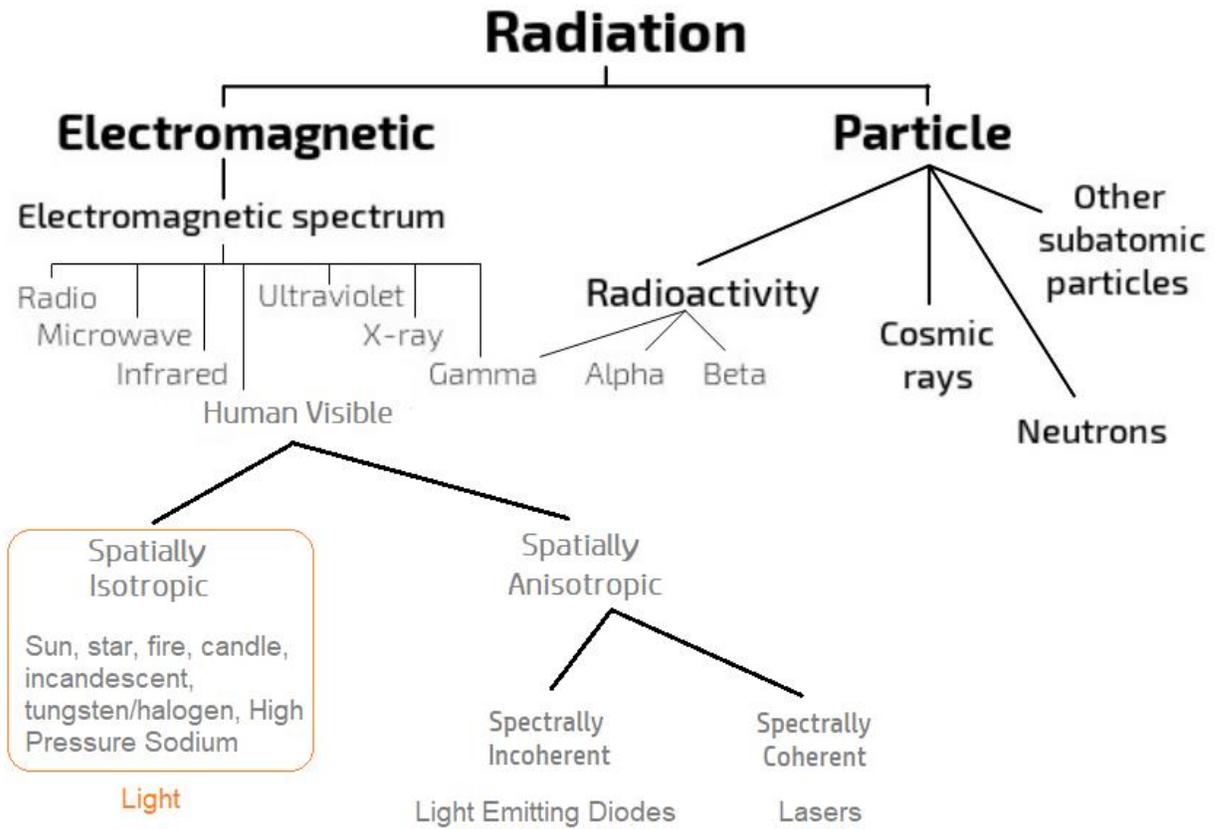


Figure 1 - Radiation

Figure 2 shows the dangerous blinding glare from an LED headlight.

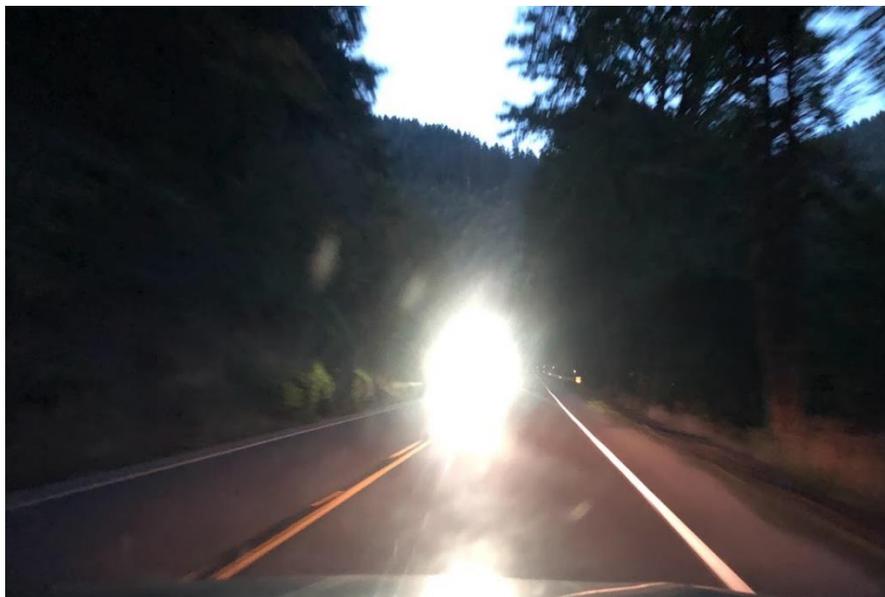


Figure 2 - LED Headlights

As an example of how dangerous LED radiation is, consider this warning shown in Figure 3 from the company Gear Light. LED chip makers exceeded 100,000,000 nits of peak luminance as of 2018.<sup>2</sup>

**WARNING:** To avoid eye injury, do not stare directly into the light beam or shine the beam directly into anyone's eyes. This product is not designed, intended, or recommended for children or hazardous environments.



Figure 3 - LED Flashlight

Neither the Insurance Institute for Highway Safety nor the National Highway Traffic Safety Administration has addressed the use of LED radiation devices. NHTSA regulation FMVSS-108 applies only to the subset of visible radiation called *light*. FMVSS-108 is not written for x-rays, microwaves or spatially anisotropic radiation from lasers or LEDs. Therefore, all LED headlights, both OEM and aftermarket, are illegal. There is a liability issue if DTRIC Insurance insures a vehicle that uses LED radiation devices and that vehicle causes an accident by dazzling on oncoming driver with LED radiation or if the vehicle headlight causes eye damage or other harm to a driver or pedestrian.

Sincerely,

*Mark Baker*

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<sup>2</sup> [focusworld.com/test-measurement/research/article/16555223/nonlaser-light-sources-highluminance-leds-target-emerging-automotive-lighting-applications](https://focusworld.com/test-measurement/research/article/16555223/nonlaser-light-sources-highluminance-leds-target-emerging-automotive-lighting-applications)