RadiareTerms

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Contents

1 Terminology for Radiometry and its Kin

Common concepts

Concept	Symbol	Unit (description)	Dimension	Relation
energy	Q	energy	$\mathsf{L}^2\mathsf{M}\mathsf{T}^{-2}$	Q
energy density	u	energy per volume	$\mathsf{L}^{-1}\mathsf{M}\mathsf{T}^{-2}$	$u = \frac{dQ}{dV}$
fluence	H	energy per area	$\mathsf{M}\mathsf{T}^{-2}$	$H = \frac{dQ}{dA}$
directance	D	energy per solid angle	$\mathsf{L}^2\mathsf{M}\mathsf{T}^{-2}$	$D = \frac{dQ}{d\Omega}$
flux	Φ	energy per time	$\mathsf{L}^2\mathsf{M}\mathsf{T}^{-3}$	$\Phi = \frac{dQ}{dt}$
exitance	M	energy per time per area	$\mathsf{M}\mathsf{T}^{-3}$	$M = \frac{d^2Q}{dtdA}$
arrivance	E	energy per time per area	$\mathsf{M}\mathsf{T}^{-3}$	$E = \frac{d^2Q}{dtdA}$
intensity	I	energy per time per solid angle	$\mathsf{L}^2\mathsf{M}\mathsf{T}^{-3}$	$I = \frac{d^2Q}{dtd\Omega\cos\theta}$
brightness	L	energy per time per area per solid angle	$\mathsf{M}\mathsf{T}^{-3}$	$L = \frac{d^3Q}{dtdAd\Omega\cos\theta}$

From the `http://physics.nist.gov/Pubs/SP330/sp330.pdf` Dimension symbols: LMT

- Talbot: `https://en.wikipedia.org/wiki/Lumen_second`

Radiometric terms

Concept	Symbol	Unit (SI)	Relation
radiant energy	Q_e	J	Q_e
radiant energy density	u_e	$\mathrm{J\,m^{-3}}$	$u_\mathrm{e} = \frac{dQ_\mathrm{e}}{dV}$
radiant fluence	H_e	$\mathrm{J\,m^{-2}}$	$H_\mathrm{e} = \frac{dQ_\mathrm{e}}{dA}$
radiant directance	D_e	$\mathrm{J\,sr^{-1}}$	$D_\mathrm{e} = \frac{dQ_\mathrm{e}}{d\Omega}$
radiant flux	Φ_e	$\mathrm{J\,s^{-1}}$	$\Phi_\mathrm{e} = \frac{dQ_\mathrm{e}}{dt}$
radiant exitance	M_e	$\mathrm{J\,s^{-1}\,m^{-2}}$	$M_\mathrm{e} = \frac{d^2Q_\mathrm{e}}{dtdA}$
irradiance	E_e	$\mathrm{J\,s^{-1}\,m^{-2}}$	$E_\mathrm{e} = \frac{d^2Q_\mathrm{e}}{dtdA}$
radiant intensity	I_e	$\mathrm{J\,s^{-1}\,sr^{-1}}$	$I_\mathrm{e} = \frac{d^2Q_\mathrm{e}}{dtd\Omega\cos\theta}$
radiance	L_e	$\mathrm{J\,s^{-1}\,m^{-2}\,sr^{-1}}$	$L_\mathrm{e} = \frac{d^3Q_\mathrm{e}}{dtdAd\Omega\cos\theta}$

Photometric terms

Concept	Symbol	Unit (named)	Unit (SI)	Unit (Talbot-based)	Relation
luminous energy	Q_v	$\mathrm{lm\,s}$	$\mathrm{cd\,rad\,s}$	T	Q_v
luminous energy density	u_v	$\mathrm{lm\,s\,m^{-3}}$	$\mathrm{cd\,rad\,s\,m^{-3}}$	$\mathrm{T\,m^{-3}}$	$u_\mathrm{v} = \frac{dQ_\mathrm{v}}{dV}$
luminous fluence	H_v	$\mathrm{lx\,s}$	$\mathrm{cd\,rad\,s\,m^{-2}}$	$\mathrm{T\,m^{-2}}$	$H_\mathrm{v} = \frac{dQ_\mathrm{v}}{dA}$
luminous directance	D_v	$\mathrm{cd\,s}$	$\mathrm{cd\,s}$	$\mathrm{T\,sr^{-1}}$	$D_\mathrm{v} = \frac{dQ_\mathrm{v}}{d\Omega}$
luminous flux	Φ_v	lm	$\mathrm{cd\,rad}$	$\mathrm{T\,s^{-1}}$	$\Phi_\mathrm{v} = \frac{dQ_\mathrm{v}}{dt}$
luminous exitance	M_v	lx	$\mathrm{cd\,rad\,m^{-2}}$	$\mathrm{T\,s^{-1}\,m^{-2}}$	$M_\mathrm{v} = \frac{d^2Q_\mathrm{v}}{dtdA}$
illuminance	E_v	lx	$\mathrm{cd\,rad\,m^{-2}}$	$\mathrm{T\,s^{-1}\,m^{-2}}$	$E_\mathrm{v} = \frac{d^2Q_\mathrm{v}}{dtdA}$
luminous intensity	I_v	cd	cd	$\mathrm{T\,s^{-1}\,sr^{-1}}$	$I_\mathrm{v} = \frac{d^2Q_\mathrm{v}}{dtd\Omega\cos\theta}$
luminance	L_v	$\mathrm{cd\,m^{-2}}$	$\mathrm{cd\,m^{-2}}$	$\mathrm{T\,s^{-1}\,m^{-2}\,sr^{-1}}$	$L_\mathrm{v} = \frac{d^3Q_\mathrm{v}}{dtdAd\Omega\cos\theta}$