PHY3145 Radiation Processes - Revision

1. Radiative transfer

Equation of radiative transfer I_ν = (function of j_ν and α_υ)

Kirchoff's Law j_ν / α_υ =

Planck function $B_\nu(\nu,T)$ =

2. Acceleration and radiation

Larmor's formula for total power in terms of acceleration (eg. Bremsstrahlung, gyrotron)

dW/dt =

Power per unit solid angle (eg. Thomson scattering)

$dW/dt\, d\Omega$ =

Power per unit frequency (in terms of F.T. of acceleration)

$dW / dt\, d\omega$ =

3. Special relativity

Lorentz γ

Lorentz transform of 4-vector (a_x, a_y, a_z, a_t)

a_x' =

a_y' =

a_y' =

a_y' =

4-vectors for space-time, velocity, massive particle momentum, photon momentum

(x, y, z, ct)

Lorentz transform of E and B fields

$E_x' =$ $B_x' =$

$E_y' =$ $B_y' =$

$E_z' =$ $B_z' =$

Lorentz force

$d/dt(\Upsilon mv) =$

Proper time t' = (time in lab. frame)

4. Scattering

Scattering overview – fill in the conditions on frequency and velocity for these scattering treatments

Thomson scattering	**Compton scattering**
Inverse Compton	

5. Radiation processes

Give a brief description of the following radiation processes

Apparent superluminal motion

Bremsstrahlung

Gyrotron

Synchrotron

Thomson scattering

Compton scattering

Inverse Compton scattering

Sunyaev-Zeldovich effect