**IB Physics**

**27G1-H Group Quiz**

Name

**Show your work, and circle your answers and use sig figs to receive full credit.**

**Numerical Questions:**

1. A photon creates a proton/anti proton pair each with 98.0. MeV of kinetic energy. What is the maximum wavelength the photon could have?

2. A photon with a wavelength of 4.47x10-13 m creates an electron/positron pair each with what maximum kinetic energy?

3. A 1.30x10-15 m photon creates a charged matter/anti matter pair each having a kinetic energy of 337 MeV. What is the rest mass of the particles created in MeV?

4. What is the velocity of a **proton** with a de Broglie wavelength of 740. nm?

5. What is the mass of a particle that has a de Broglie wavelength of 550. nm, and a velocity of 0.680 m/s?

6. What is the de Broglie wavelength of an **electron** with a velocity of 1630 m/s?

**Conceptual Questions:**

G1: How do you identify pair production in bubble chamber tracks? (draw a picture)

G1: What happens to the anti-matter particles that pair production creates?

G1: Immediately after the big bang, there were many energetic photons, capable of creating matter/anti-matter particles of great size. The expansion of the new universe stretched the photons, decreasing their wavelength.

a. What happened to the energy of the photons when the wavelength increased?

b. What happened to the mass of the particles they could create?

c. If matter particles from the big bang were created by pair production, why is there still matter left? (i.e. why haven't all the matter particles annihilated their anti-matter partners?

H. Why don't we see the wave behaviour of things like baseballs?

H. Why are electrons used in electron microscopes? Why not use light?

H. If electrons can be waves, could electron orbits around atoms be standing waves? (i.e. there are only certain properly defined states they could be in...)