

## SH/IM Particle Physics - Introductory Quiz

Exam number (optional - so you can find your marked script):

1. What are the allowed spin states of an electron?
2. List the quarks and leptons in the Standard Model. Give the electric charge,  $Q$ , and spin,  $S$ , of each one.
3. List the forces present in the Standard Model, with the associated boson(s). Give the electric charge,  $Q$ , and spin,  $S$ , of each boson.
4. Write down the components of the four momentum of a particle,  $p^\mu$ .

5. What is the relativistic relationship between mass,  $m$ , energy,  $E$  and three-momentum,  $p$ ?

6. Write down the definition of the scalar product of two four momenta,  $p_a$  and  $p_b$ .

7. Draw a Feynman diagram illustrating  $e^+e^- \rightarrow \mu^+\mu^-$  scattering.

8. What is the *cross section* of a process?

9. What is the *branching ratio* of a process?