Week 14 Lecture 34 Quiz:
Monte Carlo Simulation I and II

ECE 656: Electronic Conduction In Semiconductors

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Answer the **multiple choice questions** below by choosing the **one, best answer**. Then **ask a question** about the lecture.

1) When simulating trajectories, $\left(\vec{r}(t),\vec{p}(t)\right)$, in phase space, which of the following is true?
   a) $\vec{r}(t)$ is continuous and $\vec{p}(t)$ is continuous.
   b) $\vec{r}(t)$ is discontinuous and $\vec{p}(t)$ is continuous.
   c) $\vec{r}(t)$ is continuous and $\vec{p}(t)$ is discontinuous.
   d) $\vec{r}(t)$ is discontinuous and $\vec{p}(t)$ is discontinuous.
   e) None of the above

2) What is "self scattering"?

   a) A many body effect in which an electron interacts with itself.
   b) An electron-electron scattering event in which an electron scatters from another electron.
   c) An electron-electron scattering event in which an electron scatters from the entire plasma of all the electrons.
   d) A mathematical technique that simplifies the computation of free-flight times.
   e) A mathematical technique that simplifies the computation of the final scattering state.

3) How does the self-scattering rate vary with energy?

   a) It is independent of energy.
   b) It increases monotonically with energy.
   c) It increases monotonically with energy.
   d) It depends on the energy dependence of all the other scattering processes.
   e) As energy to the power of a characteristic exponent, *s*.

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4) To simulate a carrier trajectory by Monte Carlo simulation, we choose four random numbers. What do these four random numbers determine?
   a) The position, momentum, energy, and velocity just before a collision.
   b) The position, momentum, energy, and velocity just after a collision.
   c) The duration of the free flight, the scattering event that terminated the free flight, and the two angles that describe the direction just after scattering.
   d) The duration of the free flight, the scattering event that terminated the free flight, the energy just after scattering, and the direction just after scattering.
   e) The duration of the free flight, the scattering event that terminated the free flight, the energy just after scattering, and the position just after scattering.

5) Which of the following is true?

   a) Monte Carlo simulation is a numerical technique to solve the BTE.
   b) Monte Carlo simulation is a numerical technique to solve the near-equilibrium BTE.
   c) Monte Carlo simulation is a numerical technique to solve the balance equations.
   d) Monte Carlo simulation is a numerical technique that can go beyond the BTE by including e-e correlations.
   e) Monte Carlo simulation is a numerical technique that can go beyond the BTE by including quantum transport effects.

6) What question do you have about this lecture?

You will NOT need to turn this quiz in