

EE582: Final Project  
Spring 2008  
(Due April 24, 2008)

Goal:

Investigate the dependence of the electron velocity on the electric field dependence in zigzag carbon nanotubes using Monte Carlo method. All of the following sections will be discussed in class. Furthermore mini-assignment will be made to help with different sections of the project.

1. The random generator below provides random number uniformly distributed between 0 and 1. You may use it or use built random number generators.
2. Develop initial distribution of electron energy and momentum
3. Identify scattering processes and compute scattering rates
4. Develop a code using any programming language (Matlab, c, fortran, Java)
5. Use time average to compute velocity at each field

Random # generator

```
C*****
```

```
  SUBROUTINE SETRN(Q)
  IMPLICIT REAL*8(A-H,O-Z)
  include 'common_n.inc'
C*** INITIALIZE WITH A CALL TO SETRN(0.D0-1.D0)
  QA1=2057713.0D0
  QA2=16676923.0D0
  QBASE=2.**24
  QC=DINT(QBASE*(QBASE*Q))
  QB1=DINT(QC/QBASE)
  QB2=QC-QB1*QBASE
  QB1=DMOD(QB1,QBASE)
  QB2=DINT(QB2/2.D0) * 2.D0 + 1.D0
  RETURN
  END
```

c

```
C*****
```

```
  FUNCTION RANNUM(I)
  IMPLICIT REAL*8(A-H,O-Z)
  include 'common_n.inc'
C*** FROM CLAMPS AT NRCC - FROM KALOS
10  QD2=QA2*QB2
  QE2=DINT(QD2/QBASE)
  QC2=QD2-QBASE*QE2
  QB1=DMOD(QE2+DMOD(QA1*QB2,QBASE)+DMOD(QA2*QB1,QBASE),QBASE)
  QB2=QC2
  RANNUM=QB1/QBASE
  IF(RANNUM.EQ.0.0D0)GO TO 10
  RETURN
  END
```