In [1]:
```
#Libraries
import csv
import time;
import datetime;
from numpy import *
from scipy import fftpack
import matplotlib.pyplot as plt
from os import listdir
from os.path import isfile, isdir, join, basename
from scipy import optimize;
from mpl_toolkits.mplot3d import Axes3D;

%matplotlib inline
myPath = "Rabi\\Csvs\\"
passfilter = -1,50 # 50 is our standard
direc = [myPath + i for i in listdir(myPath) if isdir(join(myPath, i))]
def FrequencyPass(x,low,high):
    t = []
    for i in range(len(x)):
        if i < high and i >low:
            t.append(x[i])
        else:
            t.append(0)
    return t

files = ["Rabi\\Csvs\\-1.05A\\"+ i for i in listdir("Rabi\\Csvs\\-1.05A\\")
         if isfile(join("Rabi\\Csvs\\-1.05A\\", i))]
for filepath in files:
    print ("opening : " + filepath)
    datafile = open(filepath, 'r');
    datareader = csv.reader(datafile, delimiter=',');
    file = [];
    timeScale = [];
    voltScale = [];
    for row in datareader:
        file.append(row);
        voltScale.append(float(row[4]));
        timeScale.append(float(row[3]));

    image = plt.figure(num=None, figsize=(20, 6), dpi=200)
    plt.plot(timeScale,voltScale,c = 'gray')
    plt.title("Raw Data")
    plt.xlabel(r'$TimeScale [(25 \times 10^-3) \cdot s]$')
    plt.ylabel(r'$Voltage Amplitude [(5.12 \times 10^-3) \cdot V]$')
    plt.show()
    image.savefig("Rabi\\Raw Data\\" + basename(filepath) +" "
                  + datetime.datetime.fromtimestamp(time.time())
                  .strftime('%Y-%m-%d %H,%M,%S, ') + ".png")
```

```
image = plt.figure(num=None, figsize=(20, 6), dpi=200)
fourierv = fftpack.rfft(voltScale)
plt.plot(range(len(fourierv)),abs(fourierv),'r-')
plt.title("Fourier Series")
plt.xlabel("Fourier Coefficient Index []")
plt.ylabel("Coefficient Magnitude []")
plt.xlim(passfilter)
plt.show()
image.savefig("Rabi\\Fourier Series\\" + basename(filepath) +" "
              + datetime.datetime.fromtimestamp(time.time())
              .strftime('%Y-%m-%d %H,%M,%S, ') + ".png")

image = plt.figure(num=None, figsize=(20, 6), dpi=200)
plt.plot(timeScale,voltScale,c = 'gray')
fourierv = fftpack.irfft(
    FrequencyPass(fourierv,passfilter[0],passfilter[1]))
plt.plot(timeScale, fourierv, 'r-')
plt.title("Raw Data Comparison with Fourier Series")
plt.xlabel(r'$TimeScale [(25 \times 10^-3) \cdot s]$')
plt.ylabel(r'$Voltage Amplitude [(5.12 \times 10^-3) \cdot V]$')
plt.show()
image.savefig("Rabi\\Comparison\\" + basename(filepath) +" "
              + datetime.datetime.fromtimestamp(time.time())
              .strftime('%Y-%m-%d %H,%M,%S, ') + ".png")
```

```
In [2]: %matplotlib inline
        i = 0
        fig = plt.figure(num=None, figsize=(20, 20), dpi=200)
        ax = plt.axes(projection = '3d')
        for filepath in files:
            datafile = open(filepath, 'r');
            datareader = csv.reader(datafile, delimiter=',');
            file = [];
            timeScale = [];
            voltScale = [];
            for row in datareader:
                file.append(row);
                timeScale.append(float(row[3]));
                voltScale.append(float(row[4]));

            fourierv = fftpack.rfft(voltScale)
            fourierv = FrequencyPass(fourierv,passfilter[0],passfilter[1])
            fourierv = [abs(i) for i in fourierv]
            fourierv = fourierv[abs(passfilter[0]):abs(passfilter[1])]
            ax.plot3D(range(len(fourierv)), [i]*len(fourierv), fourierv,
                      label = basename(filepath))
            i += 1

        ax.set_title("Fourier Analysis of Rabi Oscillations at 1.05A")
        ax.set_xlabel("Fourier Coefficient Index")
        ax.set_ylabel("Data Sample Number")
        ax.set_zlabel("Fourier Coefficient Magnitude")
        plt.legend()
        ax.view_init(elev=60., azim=270.)
        plt.show()
        save = input()
        if save != "n":
            fig.savefig("Rabi\\3D Plot\\" + save + " "
                        + datetime.datetime.fromtimestamp(time.time())
                        .strftime('%Y-%m-%d %H,%M,%S, ') + ".png")
```