



Carolyn Jo Shields  
Freshman  
Knoxville College  
Faculty Advisor: Jim Burnett  
Program:  
Research Alliance in Math & Science  
  
Email: [shieldsdj@ornl.gov](mailto:shieldsdj@ornl.gov)  
Home: [bballqueen2578@yahoo.com](mailto:bballqueen2578@yahoo.com)

### **Research Area: Radio Frequency Propagation**

In an ideal world we would be able to receive strong signals to our cell phones and WIFI transmitters at all times. Real world radio propagation is rarely easy. There are many explanations why frequency disruptions occur. Propagation is used to explain how radio waves behave when they are transmitted, or are propagated from one point on the earth to another. Outdoors is where you can expect to get the best signal, due to the lack of interruptions caused by multipath signals. Indoors is where you run into most the difficulty, due to four physical modes: attenuation, reflections, diffractions, and scattering. Our situation at ORNL is that of an increase in cellular phones on the premises. The Radio Frequency (RF) signal outdoors is strong and there are little to no dropped calls. On the other hand the RF signal inside office buildings and laboratories is very weak for many cellular carriers. Due to complex building structures on site; more transmitter-to-receiver separations have occurred. This has caused a major dilemma for employees who want to use their cellular devices. I will explain the effects of Radio Frequency (RF) propagation in the workplace. Solving this problem on site would be beneficial to everyone receiving a frequency signal for their devices in the workplace.

#### **Research Mentor:**

Don Williams  
Information Technology Division  
Oak Ridge National Laboratory

865-574-9615  
[williamsd@ornl.gov](mailto:williamsd@ornl.gov)