1145-94-1163 **Emma Lennen*** (elennen@ucsb.edu), **Wade Bloomquist**, **Jose Zavala**, **Gulnoza Bobokalonova** and **Rebecca Embar**. *Combinatorial Properties of Diagonal Distance.*

This talk will be devoted to the study of diagonal distance on graphs. Quantum codes can be represented by graphs with vertices labeled by an element of $(\mathbb{Z}/2\mathbb{Z})$. When transmitting this information, two kinds of errors can occur. A vertex could either flip its value, or flip the value of the vertices adjacent to it. The definition of diagonal distance arose through the study of these graph codes by Luna, Reid, De Sanctis, and Gheorghi and is defined as the minimal number of errors that reverts a labeling back to itself.

We construct graphs with arbitrarily high diagonal distance, utilizing combinatorial relationships between the neighborhoods of vertices. We explore relationships between diagonal distance and other properties of graphs. For instance, we have proven that diagonal distance is invariant under local complement, i.e. taking the complement of the neighborhood subgraph of a vertex. In addition, we studied the effect of the Cartesian graph product on diagonal distance. Understanding the construction of underlying graphs with certain diagonal distance will provide insight on how to construct better quantum error correcting codes. (Received September 19, 2018)