1138-05-323 **Hein van der Holst*** (hvanderholst@gsu.edu), Park Place 25, Atlanta, GA 30302, and **Serguei Norine** and **Robin Thomas**. *On the second homology group of the configuration space of two particles on a graph.*

For a graph $G = (V, E)$, a 2-cycle is a bilinear form $d : E \times E \to \mathbb{Z}$ such that $d(e, f) = 0$ if e and f have a common vertex, and $d(\cdot, e)$ and $(e, \cdot)$ are circulations for each edge e. Examples of 2-cycles are 2-cycles coming from pairs of disjoint cycles of G. Also on each subgraph of G that is a subdivision of K_5 or $K_{3,3}$, there are 2-cycles. It had been a conjecture that each 2-cycle can be written as a sum of these types of 2-cycles. This has recently been disproved by Barnett.

In this talk, we give a finite list of types of 2-cycles such that each 2-cycle is a sum of 2-cycles from this list. We also show that for Kuratowski-connected graphs, it suffices to have 2-cycles coming from pairs of disjoint cycles of G and 2-cycles on subgraphs of G that are subdivisions of K_5 or $K_{3,3}$.

This provides a structure theorem for the second homology group of the configuration space of two particles on a graph. (Received February 12, 2018)