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John Villalpando*, 60 West Olsen Road, Thousand Oaks, CA 91360, and **Vesta Coufal, Karri Fogel, Aparna Higgins, William Higgins, Rob Ray** and **Kathie Yerion**. *Trees for Given Values of the Span and Icap for $L(2,1)$ -Colorings.*

An $L(2,1)$ -coloring of a graph is a labeling of the vertices using non-negative integers such that adjacent vertices differ in label by at least 2 and distance two vertices differ in label. A well studied invariant of $L(2,1)$ -colorings, the span denoted by λ , is the smallest integer k for a given graph such that there exists an $L(2,1)$ -coloring of the graph using only non-negative integers less than or equal to k . An $L(2,1)$ -coloring of a graph is irreducible if reducing the label on any vertex violates an $L(2,1)$ -coloring condition. The invariant icaps, denoted κ , is the least number of color classes required to create an irreducible $L(2,1)$ -coloring on a given graph. For any tree T it is known that $\Delta + 1 \leq \kappa \leq \lambda + 1$ and $\lambda \in \{\Delta + 1, \Delta + 2\}$ where Δ is the maximum degree of the tree. Thus, there are only three possible values for κ ; $\{\Delta + 1, \Delta + 2, \Delta + 3\}$. Then for the two possible values of the span, we consider the three possible values of the icap, determine if there exist a tree with the two specified values of the invariants, and provide a family of such trees if any exist. (Received September 16, 2016)