

# The spectra of several multigraphs with 4 vertices, 6 edges, and edge multiplicity at most 2

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Let  $G$  be a multigraph on 4 vertices with 6 edges and edge multiplicity at most 2. Let  ${}^\lambda K_n$  denote the complete multigraph on  $n$  vertices where each edge is repeated  $\lambda$  times. Necessary and sufficient conditions on  $n$  and  $\lambda$  for the existence of a  $G$ -decomposition of  ${}^\lambda K_n$  are presented for several such multigraphs. This research is supported by grant number A1359300 from the Division of Mathematical Sciences at the National Science Foundation.