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## THE STRUCTURE OF QUARTIC GRAPHS WITH MINIMAL SPECTRAL GAP

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Motivated by a conjecture by Aldous and Fill we investigate regular graphs  $G$  with minimum spectral gap, that is, graphs for which the difference between the two largest eigenvalues of the adjacency matrix of  $G$  is minimal. For cubic graphs this has already been done by Brand, Guiduli and Imrich, who showed that these graphs look like paths built from specific blocks. We extend this result to 4-regular graphs and conjecture that the structure is unique for graphs on at least eleven vertices.