

# Locally Dense Independent Sets in Regular Graphs of Large Girth

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## Abstract

For an integer  $d \geq 3$  let  $\alpha(d)$  be the supremum over all  $\alpha$  with the property that for every  $\epsilon > 0$  there exists some  $g(\epsilon)$  such that every  $d$ -regular graph of order  $n$  and girth at least  $g(\epsilon)$  has an independent set of cardinality at least  $(\alpha - \epsilon)n$ .

Extending an approach proposed by Lauer and Wormald (Large independent sets in regular graphs of large girth, *J. Comb. Theory, Ser. B* **97** (2007), 999-1009) and improving results due to Shearer (A note on the independence number of triangle-free graphs, II, *J. Comb. Theory, Ser. B* **53** (1991), 300-307) and Lauer and Wormald, we present the best known lower bounds for  $\alpha(d)$  for all  $d \geq 3$ .