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*Partition regularity over Gaussian integers.*

We show that for any finite coloring of the Gaussian integers, there exist distinct nonzero elements  $x$  and  $y$  of the same color such that  $x^2 - y^2 = n^2$  for some Gaussian integer  $n$ . We will also explain the connection between this problem with a structure theorem for multiplicative functions on the Gaussian integers. (Received January 11, 2015)