# COLORING GRAPH PRODUCTS, A FOURIER APPROACH

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Consider the following combinatorial question: A 3-color traffic light is controlled by n 3-position switches. You are told that whenever you change the position of every single switch the light changes. What possible mechanism could explain that? Can you still deduce something useful if the above holds only for 99.99% of the switch configurations? This is a special case of coloring a graph which is the n-fold product of a fixed regular graph (in this case the triangle.) We analyze the question of large independent sets and colorings in such graphs using Fourier analysis on Abelian groups. This analytic (or perhaps algebraic) approach enables us to prove stability statements that currently seem to be beyond the reach of straightforward combinatorial arguments. For more prcise formulation and further details please see www.ma.huji.ac.il/ ehudf/docs/ADFS.ps This is joint work with Noga Alon, Irit Dinur and Benny Sudakov.