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Sinai Robins* (rsinai@ntu.edu.sg) and **James Propp** (jpropp@cs.uml.edu). *TILING LATTICES WITH TRANSLATES OF SUBLATTICES*. Preliminary report.

We study the problem of tiling (that is, exactly covering) an n -dimensional lattice by finitely many translates of sublattices. This problem extends the 1-dimensional case studied by Morris Newman and others. If we assume that each tiling sublattice is a Cartesian product of arithmetic progressions, we can prove that two of the sublattices must be translates of one another. In the absence of the assumption of special structure, it can happen (for $n > 2$) that no two of the sublattices are translates of one another. We use theta functions to give an (almost) equivalent description in terms of multidimensional Gauss Sums. The case $n = 2$ remains open. (Received March 02, 2009)