

# HOW MANY FOURIER COEFFICIENTS ARE NEEDED?

EFFIE PAPAGEORGIU

ABSTRACT. We are looking at families of functions or measures on the torus (in dimension one and two) which are specified by a finite number of parameters  $N$ . The task, for a given family, is to look at a small number of Fourier coefficients of the object, at a set of locations that is predetermined and may depend only on  $N$ , and determine the object. We look at (a) the indicator functions of at most  $N$  intervals of the torus and (b) at sums of at most  $N$  complex point masses on the two-dimensional torus. In the first case we reprove a theorem of Courtney which says that the Fourier coefficients at the locations  $0, 1, \dots, N$  are sufficient to determine the function (the intervals). In the second case we produce a set of locations of size  $O(N \log N)$  which suffices to determine the measure.

Joint work with M. Kolountzakis (Univ. of Crete).

*Current address:* Department of Mathematics and Applied Mathematics, University of Crete, Heraklion, Greece