Suppose $\Lambda \subseteq \mathbb{R}^2$ has the property that any two exponentials with frequency from $\Lambda$ are orthogonal in the space $L^2(D)$, where $D \subseteq \mathbb{R}^2$ is the unit disk. Such sets $\Lambda$ are known to be finite (by work of Iosevich and Rudnev and by Fuglede) but it is not known if their size is uniformly bounded.

We show that if there are two elements of $\Lambda$ which are distance $t$ apart then the size of $\Lambda$ is $O(t)$. As a consequence we improve a result of Iosevich and Jaming and show that $\Lambda$ has at most $O(R^{2/3})$ elements in any disk of radius $R$.

As is usual in this field our method works by studying properties of the zero set of the Fourier Transform of the disk. This imposes constraints on the interpoint distances of points of $\Lambda$, essentially that they are nearly integers.

This is joint work with Alex Iosevich (Rochester).

**Speaker Biography**

Mihalis Kolountzakis is a Professor of Mathematics at the University of Crete, Greece. He got his PhD from Stanford University (1994) and has held temporary positions at the Institute for Advanced Study, the University of Illinois and Georgia Tech. His work involves mainly applications of harmonic analysis to problems of discrete geometry and combinatorial number theory.

**Host: Prof. Sinai Robins, Division of Mathematical Sciences, School of Physical and Mathematical Sciences**

SCHOOL OF PHYSICAL AND MATHEMATICAL SCIENCES
DIVISION OF MATHEMATICAL SCIENCES
SPMS-MAS-03-01, 21 NANYANG LINK, SINGAPORE 637371
FAX: +65 6515 8213 TEL: +65 6513 7423