

## abstract

ARITHMETIC COMBINATORICS

Topic:

Speaker:

Affiliation:

Date:

Time/Room:

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Let  $G$  be a finite Abelian group, say  $\mathbb{Z}/N\mathbb{Z}$ . A set  $\Lambda = \{\lambda_1, \dots, \lambda_m\}$  is called *dissociated* if any equality  $\sum_{i=1}^m \varepsilon_i \lambda_i = 0$ , where  $\varepsilon_i \in \{0, \pm 1\}$  implies that all  $\varepsilon_i$  equal zero.

A well-known result of Rudin says that for any such set the number of solutions of the equation

$$\begin{equation} \label{1} x_1 + \dots + x_p = x_{p+1} + \dots + x_{2p}, \quad x_i \in \Lambda \end{equation}$$

is at most  $(Cp)^p |\Lambda|^p$ , where  $C > 0$  is an absolute constant.

We extend his result :

any set  $Q \subseteq \Lambda$  has at most  $(C_1 p)^{dp} |Q|^p$  solutions of (\ref{1}).

Also we consider an inverse problem :

suppose that  $Q$  has  $\gg p^{dp} |Q|^p$  solutions of (\ref{1}).

Is it true that  $Q$  is highly structured?

We prove that the answer is yes. Our method allows us to obtain an elementary proof of recent Bourgain's extension of Chang's theorem on structure of sets of large exponential sums

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and give some new constructions of sets of large Fourier coefficients.