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Can one hear a real symmetric matrix?

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The question asked in the title is addressed from two points of view:

First, we show that providing enough (term to be explained) spectral data, suffices to reconstruct uniquely generic (term to be explained) matrices. The method is well defined but requires somewhat cumbersome computations.

Second, restricting the attention to banded matrices with band-width much smaller than the dimension, one can provide more spectral data than the number of unknown matrix elements.

We make use of this redundancy to reconstruct generic banded matrices in a much more straight- forward fashion where the "cumbersome computations"can be skipped over.

Explicit criteria for a matrix to be in the non-generic set are provided.

Primary author: Prof. SMILANSKY, Uzy (Weizmann Institute of Science, Rehovot)

Presenter: Prof. SMILANSKY, Uzy (Weizmann Institute of Science, Rehovot)

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