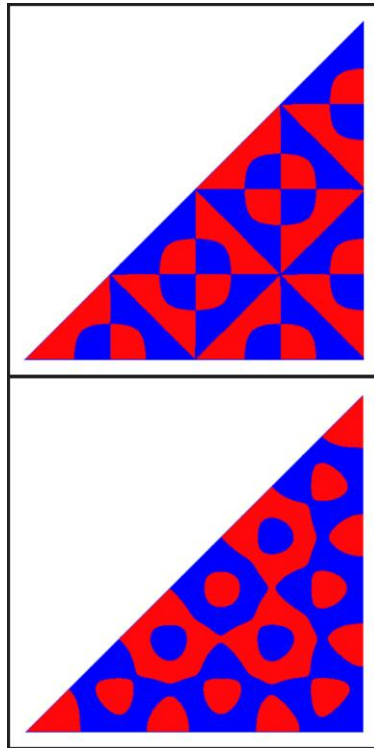


Can one *count* the shape of a drum

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Several decades ago M Kac asked his famous question : "Can one *hear* the shape of the drum?" - in other words- under which conditions, if at all, can the frequencies determine the shape of the drum's boundary. This problem has many important implications in physics and mathematics, and in the first part of the talk I shall review the present status of this subject. In the second part, I shall address the new version of the question, in which one replaces "hear" by "count". That is, instead of considering the sequence of frequencies, one counts the number nodal domains of the corresponding wave functions and consider the resulting "nodal count sequence". I'll show that this sequence of integers stores information on the shape of the drum. Moreover, counting the drum in this way can also resolve between *isospectral* drums which have different shapes but produce the same spectra of vibrations.