Distinguished Lecturer Series

Gil Kalai

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Why quantum computers cannot work

Quantum computers are hypothetical devices based on quantum physics that can out-perform classical computers. A famous algorithm by Peter Shor shows that quantum computers can factor an n-digit integer in n^3 steps, exponentially better than the number of steps required by the best known classical algorithms. The question of whether quantum computers are realistic is one of the most fascinating and clear-cut scientific problems of our time.

What makes it hard to believe that superior quantum computers can be built is that building them represents a completely new reality in terms of controlled and observed quantum evolutions, and also a new computational complexity reality. What makes it hard to believe that quantum computers cannot be built is that this may require profoundly new insights into the understanding of quantum mechanical systems.

His work is geared toward a negative answer, and he offers an explanation within the framework of quantum mechanics, for why quantum computers cannot be built.

He will also mention some highlights from a scientific debate on the matter between himself and Aram Harrow (started here: http://rjlipton.wordpress.com/2012/01/30/perpetual-motion-of-the-21st-century/

**13:00-15:00 on Wednesday, January 15, 2014,
Harry and Carol Saal Auditorium, Alon Building for Hi-Tech (37/202).**