

# MATH ENCOUNTERS



## *piecemeal* PUZZLE: *the* GRAPH RECONSTRUCTION *problem*

*Speaker:* Rik Sengupta

Wednesday, August 7, 2024

**Afternoon Presentation**

4:00 pm ET (New York)

**Evening Presentation**

7:00 pm ET (New York)

**National Museum of Mathematics**

225 Fifth Avenue

New York, NY

Imagine being given a 10,000-piece jigsaw puzzle of the cover of the Beatles' *White Album*, which is famously almost entirely white. What's worse, instead of solving it directly, you are only allowed to take a few pieces randomly out of the box, examine them, and then put them back into the box. How long would it take you to fully reconstruct the *White Album* cover, assembling your information piece by piece? This strange little problem has deep connections with a computer science problem called trace reconstruction, as well as the classic graph theory problem of graph reconstruction, with a rich history and many active lines of current research. Join Rik Sengupta, Research Scientist at IBM Research in Cambridge, as he sets up the problem mathematically, gives some insights into solving it, and connects it to important computational problems from today such as mapping the internet, understanding the power of random coin flips, and identifying evolutionary patterns to identify common ancestors of seemingly unrelated animals.

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