



# WPI

# HAROLD J GAY LECTURE SERIES

## PDEs and Fractals

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## Are Black Holes Real?

Friday, Feb. 14, 2014

3:10pm, Salisbury Labs 402



Geometry with its applications has been at the heart of the development of partial differential equations and boundary value problems since the very beginning. In physics, biology, economics, and other applied fields, a variety of new problems are now emerging that display unusual geometrical, analytical and scaling features, possibly of fractal type. The objective of these lectures is to acquire the view of outstanding mathematicians on the subject of differential equations and fractals, and their developments and applications, in a broad perspective encompassing both classical highlights and contemporary trends.

**ABSTRACT** Black Holes are precise mathematical solutions of the Einstein field equations of General Relativity. Some of the most exciting astrophysical objects in the Universe have been identified as corresponding to these mathematical Black Holes, but since no signals can escape their extreme gravitational pull, can we be sure that we have made the right identification?

I will show how the issue of reality of Black Holes can be addressed by nothing more than pen and paper. I will discuss three fundamental mathematical problems intimately connected to the issue of Reality of Black Holes: Rigidity, Stability and Collapse. I will then survey some of the main results which have been obtained in the last thirty years.



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Refreshments available before the lecture  
in Salisbury Labs 402

Participation of faculty and students  
is most welcome

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