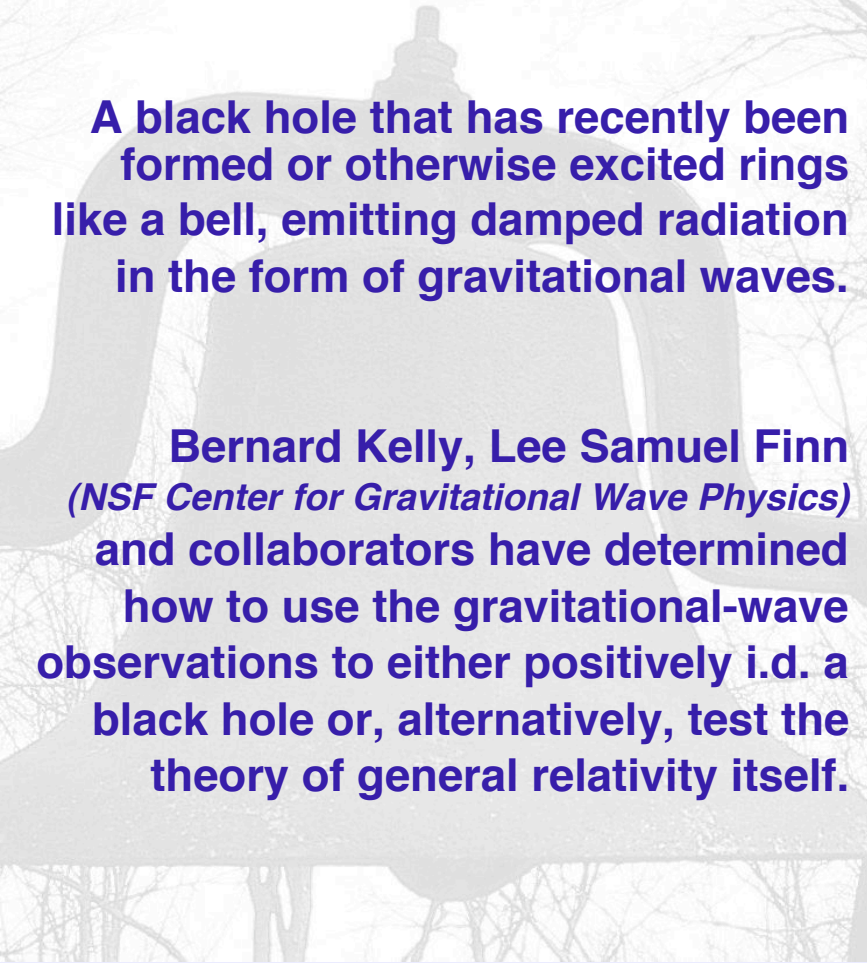


For Whom the Source Tolls:

Gravitational-wave observations of compact source ring-down will identify black holes and test general relativity



A black hole that has recently been formed or otherwise excited rings like a bell, emitting damped radiation in the form of gravitational waves.

**Bernard Kelly, Lee Samuel Finn
(NSF Center for Gravitational Wave Physics)
and collaborators have determined
how to use the gravitational-wave
observations to either positively i.d. a
black hole or, alternatively, test the
theory of general relativity itself.**

The LISA gravitational wave observatory will be sensitive to ring-down modes from very high mass compact sources. The following results arise from examining the relationship between modes from a given source:

Black Hole Identification

Gravitational-wave observations of two or more modes should uniquely identify that source as a general relativistic black hole and determine its mass and angular momentum.

New Physics

An observation inconsistent with a black hole would imply a different theory of gravity, or that the gravitational radiation arises from an exotic source such as strange matter or boson star.

***Classical and Quantum Gravity 21 (2004)
787 - 803, Dreyer, Kelly, Krishnan, Finn,
Garrison and Lopez-Aleman.***

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