

1833 - The First Image of a Black Hole

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Abstract:

One of the most bizarre, but perhaps also most fundamental predictions of Einstein's theory of general relativity are black holes. They are extreme concentrations of matter with a gravitational attraction so strong, that not even light can escape. The inside of black holes is shielded from observations by an event horizon, a virtual one-way membrane through which matter, light and information can enter but never leave. This loss of information, however, contradicts some basic tenets of quantum physics. Does such an event horizon really exist? What are its effects on the ambient light and surrounding matter? How does a black hole really look? Can one see it? Indeed, recently we have made the first image of a black hole and detected its dark shadow in the radio galaxy M87 with the global Event Horizon Telescope experiment. Detailed supercomputer simulations faithfully reproduce these observations. Simulations and observations together provide strong support for the notion that we are literally looking into the abyss of the event horizon of a supermassive black hole. The talk will review the latest results of the Event Horizon Telescope, its scientific implications and future expansions of the array.