

Colloquium

The Black Hole Graviton Laser TIME BOMB

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Black holes admit quantum mechanical bound states of ultra light particles such axions or neutrinos. These states can undergo quantum transitions absorbing or emitting gravitons. Graviton trajectories, in the particle picture, in principle can correspond to gravitons that orbit the black hole arbitrarily many times before finally escaping to infinity. Quantum mechanically, such graviton trajectories correspond to graviton-black hole scattering states which exhibit an arbitrarily large time delay before they emerge at infinity. The spontaneous emission of such graviton states coupled with their subsequent stimulated emission as the graviton circles around the black hole through the lasing medium, can in principle give rise to significant amplification. The observation of intense beams of coherent gravitons would then be a confirmation of the existence of ultra light massive particles and of the existence of black holes. As the coupling of gravitons to matter is so small, that trajectories of the order of 10^{30} m would be required for significant amplification. This corresponds to 10^{13} years. It has only been at most 14 times 10^9 years since the big bang. Hence in some years particularly harmfully, amplified graviton death rays will start to be emitted from black holes all over the universe, they are in this sense a time bomb. To be in the path of such a ray will not be pleasant.

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04:00 PM (Tea/Coffee at 03:30 PM)

Auditorium, TIFR-H