

# IQSE AMO QO Seminar Series

**Tuesday, August 23rd, 11:30 am ZOOM & IQSE  
seminar room (MPHY 578)**

Pizza will be served for IQSE members at 11:00 am. The talk will start around 11:30 am

**Dr. Anatoly Svidzinsky**  
*IQSE, Texas A&M University*

## **Unruh, Cherenkov and Hawking radiation from a negative frequency perspective and propagation backward in time**

A ground-state atom uniformly accelerated through the Minkowski vacuum can become excited by emitting an Unruh-Minkowski photon. From the perspective of an accelerated atom, the sign of the frequency of the Unruh-Minkowski photons can be positive or negative depending on the acceleration direction and the accelerated atom becomes excited by emitting a negative frequency photon, and decays by emitting a positive frequency photon. This process yields generation of entangled photon pairs in a squeezed state which mimics entanglement of the Minkowski vacuum. Similar effects take place for the Cherenkov and Hawking radiation. I will demonstrate that Hawking radiation appears only if the field disappears from the spacetime through the central singularity (this leads to black hole information paradox). Otherwise, black hole center acts as a time mirror that reflects infalling light and matter outside of the black hole which can be used to construct a time machine that allows us to send a signal into the past. I will also discuss radiation of atoms freely falling into a black hole through a Boulware vacuum, which is analogous to atom excitation by a uniformly accelerated mirror. Such radiation looks to a distant observer much like (but is different from) Hawking radiation.

**ZOOM information:**

<https://tamu.zoom.us/j/98156251523?pwd=QVdSdGxtL1UyY0g1L083SU5QR0QrUT09>

Meeting ID: 981 5625 1523

Passcode: 297578

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