

Professor Paul Anderson

My research is primarily in the area of quantum field theory in curved space applied to black holes and cosmology. Stephen Hawking predicted that particle production occurs near the event horizon of a black hole and some of the particles carry energy far away from the black hole causing it to “evaporate”. Much of my work on black holes focuses on the computation of the energy density and pressure of a quantum field in a spacetime containing a black hole along with a symmetric correlation function. These quantities provide an alternative way to study the Hawking effect. My research in cosmology currently involves studies of the effects quantum fields have in universes that begin by contracting and undergo a bounce when the Universe reaches a small but finite size. One question that will be addressed is whether an important approximation called the semiclassical approximation is valid in this situation.