**Principal Investigator:** Dr. Kelly Tseng

**Title:** Quantum Biology: The Effects of Near Zero Magnetic Fields on Tissue Growth

**Abstract:**

Due to the lack of protection by the earth's geomagnetic field, exposure to cosmic rays during space travel is a known health concern. The strength of the earth's magnetic field (MF) ranges from 25 to 65 microtesla (μT), whereas interstellar space is estimated to have a near zero MF (<1 μT). However, lack of protection from cosmic rays may not be the only threat to humans in near zero MFs. Data suggest that exposure to near zero and weak (<1 mT) MFs themselves can alter cellular activities. Invertebrate animal studies reveal that weak MFs can alter tissue repair, while cell culture and embryonic studies show near zero MF exposure prevents cell division and development. But the effects of near zero MF on tissue growth during wound healing and regeneration are poorly understood. We propose to investigate the effects seen from the loss of the earth's geomagnetic field on animal development, wound healing, and tissue regrowth using the vertebrate model Xenopus laevis, the African clawed frog. Xenopus is an established model for biomedical studies with well-characterized developmental processes and conserved molecular mechanisms shared with humans. Notably, Xenopus also has high regenerative ability. We hypothesize that exposure to a near zero MF will cause defects in wound healing and regeneration. Our first aim is to build the apparatus that will allow for near zero MF (<0.1 μT) studies. Our second aim is to assess the effects of near zero MFs on wound closure and functional tissue repair during regeneration, as well as during Xenopus development. Together, this project will result in the initial establishment of research infrastructure at UNLV and Nevada for interdisciplinary studies in Quantum Biology, detect the biological effects of near zero MF in a vertebrate model, and enhance the Nevada STEM workforce.