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MARIACHI - Detecting Ultra High Energy Cosmic Rays with radar.[1] HELIO TAKAI, Brookhaven National Laboratory — Ultra High Energy Cosmic Rays with energies in excess of 10^{20}eV (100 EeV) have been detected by several experiments. They present a conundrum whose solution may provide insight into the origins and evolution of the universe. There are no known sources within our galaxy or those close to us that could accelerate particles to these almost macroscopic energies, and yet the turn-on of pion production through the interactions of high energy charged particles with the 2.7K microwave background provides a strong limit for propagation from greater distances. The detection of UHECR to date has been accomplished either by detection of the particles from the extensive air showers by ground arrays or by means of detection of the light produced by the EAS in the atmosphere from Cerenkov radiation. MARIACHI (Mixed Apparatus for Radar Investigation of Cosmic-rays of High Ionization) is an innovative concept that will explore the detection of UHECR by bi-static radar using VHF transmitters. If successful, the MARIACHI technique will allow for detection of UHECR economically over much larger areas than currently possible, and might provide for detection of the associated ultra high energy neutrino flux. MARIACHI is also innovative in that ground array detectors that will initially confirm the radio signals are scintillator arrays to be built and operated by high school students and teachers. We will present the present status of the experiment.

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