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TARA: Radar Detection of UHECR Air Showers

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While the possibility of detecting the radar echoes of extensive air showers (EAS) has been discussed since the 1940's, there has been no conclusive evidence for RF scattering from EAS ionization columns to date. The Telescope Array Radar (TARA) project is by far the most ambitious effort ever undertaken to confirm the existence of this phenomenon. TARA employs two 20 kilowatt VHF television transmitters in concert with a high-gain phased Yagi array, to direct a 54.1 MHz, 8 Megawatt ERP sounding signal over the Northern Hemisphere's largest conventional cosmic ray observatory. Receiver stations located adjacent to the observatory sample the RF environment at 250 Megasamples per second, and employ smart triggering algorithms to record candidate air shower echoes. These candidates are then time-matched with air shower events detected by conventional means. If RF scattering by UHECR air showers is confirmed, the potential new remote sensing technique could have a major impact on the field of cosmic ray research.

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