

Abstract Submitted
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Telescope Array Radar (TARA) Remote Station Design and Development SAMRIDHA KUNWAR, Univ of Kansas, TELESCOPE ARRAY RADAR (TARA) COLLABORATION — The TARA project is a novel attempt utilizing a bi - static radar configuration in conjunction with a set of conventional cosmic ray detectors in the low - noise environment in Millard County, Utah, to detect Ultra - High Energy Cosmic Ray induced Extensive Air Showers. We present the design and development of the remote radar receiver system using a technique where the Doppler-shifted reflected signal off of the ionization trail from the cosmic ray is de - chirped. The approach is based on an analog frequency mixing technique whereby the input signal is mixed with a delayed copy of itself i.e $s(t) \otimes s(t - \tau)$, resulting in a beat frequency, f , which is proportional to the delay time multiplied by the cosmic ray-induced RF chirp rate. With appropriate filtering, the problem of chirp detection is ultimately reduced to that of detecting the down - converted monotone. In contrast to conventional signal processing via digital matched filtering, this is a mostly analog data acquisition system and has lower power consumption at a cost which is also comparatively inexpensive. The remote station is also subject to less radio interference, and adds stereoscopic measurement capabilities which allows unique determination of cosmic ray geometry and core location.

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