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Ultra High Energy Cosmic Ray Detection via Radar at the Telescope Array

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Ultra high energy cosmic ray (UHECR) detection has been dominated mainly by two methods: air fluorescence detection and charged particle detectors on the Earth's surface. Due to the steeply falling flux of UHECRs, these detectors must be able to observe very large apertures (thousands to tens of thousands of square kilometers) in order to collect enough statistics over several years to make meaningful measurements about the spectrum, arrival direction, and composition of cosmic rays. An alternate technique using radar was first proposed about 50 years ago, but has yet to be proven as a viable means of UHECR air shower measurement. I will discuss the Telescope Array Radar (TARA) project which is the largest and most ambitious attempt yet at detecting UHECR by their radar signature. TARA has an effective radiated power of 8 MW continuous power and is collocated with the Telescope Array detector in Millard County, Utah. I will discuss the technique of bistatic radar detection, the equipment deployed to use this technique, and the methods we will use to confirm detection of cosmic rays. This method of cosmic ray detection can have great impact on the field if proven successful due to the relatively low cost to deploy and monitor large apertures.

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