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# CoREAS simulations of inclined air showers predict refractive displacement of the radio-emission footprint

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Simulating the radio emission of inclined extensive air showers for a ground based radio-antenna array we find a systematic displacement of the radio emission with respect to the Monte-Carlo shower impact point. We corrected the radio-emission footprint for the asymmetries due to the superposition of geomagnetic and charge-excess radiation as well as for the early-late effect. The remaining displacement is found to be \SI{\sim 1500}{m} along the ground plane for showers with a zenith angle of \SI{85}{\degree}, which is relevant for air shower detectors.
A model describing this displacement by refraction in the atmosphere based on Snell's law yields good agreement with our observations from CoREAS simulations.
We thus conclude that the displacement is caused by refraction in the atmosphere.

## Keywords

Radio-detection of cosmic rays, inclined air shower, refractivity, CoREAS simulation

## Collaboration

## other Collaboration

## Subcategory

Experimental Methods & Instrumentation

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