ICRC2015

ICRC
The Astroparticle Physics Conference
34th International Cosmic Ray Conference
July 30 - August 6, 2015
The Hague, The Netherlands

Contribution ID: **685** Type: **Poster contribution**

Is radar detection of extensive air showers feasible?

Saturday, August 1, 2015 3:30 PM (1 hour)

We investigate the feasibility of the radar technique for extensive air shower detection. A set of simulations of radio wave reflection off the short-lived plasma produced by the high-energy showers in the air is performed, considering various radar setups and shower geometries. We show that the plasma produced by air showers should be treated always as underdense. Thus, we use the Thomson cross-section for scattering of radio waves with correction for molecular quenching. We sum coherently the radio waves reflected off the individual electrons over the volume of the disk-like ionization trail to obtain the time evolution of the signal arriving at the receiver antenna. The movement of the wave-scattering region behind the relativistically moving shower front is taken into account. The received power and the spectral power density of the radar echo are analysed. Based on the obtained results, we conclude that the scattered signal is too weak for the radar method to provide an efficient and inexpensive method of air shower detection. We discuss possible uncertainties of this result.

Collaboration

– not specified –

Registration number following ”ICRC2015-I/”

193

Primary author: Dr STASIELAK, Jaroslaw (Institute of Nuclear Physics PAN, Kraków, Poland)

Co-authors: WERNER, Felix (Karlsruhe Institute of Technology); Prof. WILCZYŃSKI, Henryk (Institute of Nuclear Physics PAN, Kraków, Poland); NEUNTEUFEL, Patrick (Argelander Institute for Astronomy (AIfA), Bonn, Germany); SMIDA, Radomir (Karlsruhe Institute of Technology); Dr ENGEL, Ralph (Forschungszentrum Karlsruhe); BAUR, Sebastian Samuel (KIT - Karlsruhe Institute of Technology (DE))

Presenter: Dr STASIELAK, Jaroslaw (Institute of Nuclear Physics PAN, Kraków, Poland)

Session Classification: Poster 2 CR

Track Classification: CR-EX