INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

The advancement of diverse high-energy neutrino and gamma-ray observatories has recently introduced a fresh perspective in multi-messenger astrophysics, enabling us to delve into the high-energy realms of our universe. This thesis embarks on a comprehensive examination of ultra-high energy (UHE) neutrinos and gamma-rays emitted by a variety of astrophysical sources, encompassing both Galactic and Extra-galactic entities such as young supernovae, supernova remnants, etc., spanning energy ranges from Giga-electronvolts to Zeta electronvolts. These particles emerge as secondary products resulting from the interactions of UHE cosmic rays with various targets such as protons and photons. The thesis investigates the propagation of these UHE secondary particles through space, while also scrutinizing their detectability, a crucial aspect for unraveling the origins and mechanisms behind high-energy cosmic ray production.