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TeV anisotropy
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An analytical method to test GeV-TeV gamma rays of individual sources for hadronic origin

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Anisotropies in the cosmic ray (CR) spectrum are found at different energies. While anisotropy at energies beyond the ankle (10^{18} eV) is expected due to extragalactic sources, anisotropy at TeV energies is more difficult to explain. This requires solid knowledge about sources of Galactic CRs. The main candidates for the production of these CRs are supernova remnants. However, whether the GeV and TeV gamma rays from these objects are caused by CR protons or CR electrons is uncertain in most cases. We present an analytical method to check whether the gamma ray emission of individual sources is caused by CR protons. This method is based on the detection of spatially resolved ionization signatures attributable to low-energy CR protons that penetrate molecular gas, which continuously lose energy via Coulomb interactions and adiabatic deceleration. The corresponding transport equation is solved for an arbitrary source term, so the solution is readily applicable to a variety of objects.