

W19a Particle Acceleration in the Jets of the Microquasar SS433

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SS433 is a Galactic microquasar with powerful jets, where very-high-energy particles are produced. We study nonthermal leptonic emission from two X-ray knots in SS433's jets in the light of the recent multi-wavelength data from radio to TeV gamma ray. Our detailed treatment of particle transport and evolution produces substantially different predictions from previous papers. For both regions, our model can account for the multi-wavelength data except for the GeV data. This suggests that GeV emission is mostly from different regions and/or mechanisms. We find that the acceleration process should be efficient, which could be realized by diffusive shock acceleration close to the Bohm limit. Provided that protons are accelerated at the same efficiency as electrons, our results imply that SS433 is a PeVatron, i.e., can accelerate protons beyond a PeV. Future hard X-ray and MeV gamma-ray observations can critically test our models by detecting the spectral turnover or cutoff.