Radiative time-dependent lepto-hadronic models for the X-ray binary GX 339-4 in the low-hard state

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GX 339-4 is a low-mass X-ray binary, and a strong candidate to stellar black hole. It has been extensively observed from radio wavelengths to the X-rays, both in the low-hard and in the high-soft typical spectral states of X-ray binaries. A pair of relativistic radio-emitting jets have also been resolved, what turns this system into a confirmed galactic microquasar.

In this work we apply a jet model to explain the observed broadband spectrum of GX 339-4 in the low-hard state, and make predictions for the emission in the gamma-ray domain. In particular, we intend to reproduce the variability of the source considering that it undergoes episodes of particle acceleration at the base of the jets.
In our model, the electromagnetic emission is produced through interaction of relativistic protons and electrons in the jet with matter, radiation and magnetic fields. We obtain the distribution in energy of accelerated particles in a self-consistent manner, solving the relevant equations of particle transport. Several interaction mechanisms are considered: synchrotron radiation, inverse Compton scattering, proton-proton collisions, and photomeson and photopair production. Finally, we estimate possible modifications to the high-energy spectrum due to absorption effects.

We expect to compare our predictions with the observations to be carried in the near future by instruments like the satellite GLAST and ground-based Cherenkov telescope arrays, in the GeV and TeV energy ranges, respectively.