

## Origin of Gamma-rays from the Circumgalactic medium of Andromeda Galaxy

I will highlight a recent, very interesting observation (<https://arxiv.org/abs/1903.10533>) of gamma-ray signatures in the Circumgalactic medium (CGM) of Andromeda (M31) galaxy (~100 kpc) in the light of hadronic interaction of cosmic ray (CR) protons with the cold protons of CGM. We used two fluids (thermal + Cosmic ray) hydrodynamical simulation code PLUTO in order to simulate this scenario. Many recent studies have tried to explain this observation in light of Dark matter annihilation as well as leptonic interaction of CR electrons in accretion shocks. However, we intend to motivate that one can explain this observation with simple physics of star-formation and hadronic interaction without going into exotic physics of Dark matter annihilation. In our picture, CR particles are accelerated in star formation activity in the M31 disc as well as in-situ in the shocks and combined effect of advection due to outflow and diffusion can help those CRs to reach the CGM of M31. These CRs interact hadronically with CGM protons and give rise to the observed gamma-ray signature.

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