

W02a External inverse-Compton signatures in the early TeV afterglow of GRB 221009A

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For the first time, the early onset of tera-electronvolt (TeV) afterglow of a gamma-ray burst (GRB 221009A) has been observed by the Large High Altitude Air Shower Observatory (LHAASO) at 230 seconds after the trigger, which coincides with the first main peak of its prompt X-ray emission. Here, we calculate the inverse-Compton emission in the relativistic shock, considering two sources of seed photons for scattering: synchrotron photons from the shock (synchrotron self-Compton or SSC) and X-ray photons from the prompt emission (external inverse-Compton or EIC). We find that, while the SSC component dominates the emission, an additional EIC component could provide better solution to the sub-structure of the TeV light curve by the chi-square test. We also discuss the shock wave dynamics implied by the temporally-close relation between the prompt emission and the onset of TeV afterglow.