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First NuSTAR observations of the BL Lac – type blazar PKS 2155-304: constraints on the jet content and distribution of radiating particles GRZEGORZ MADEJSKI, SLAC - Natl Accelerator Lab, KRZYSZTOF NALEWAJKO, Copernicus Center, KRISTIN MADSEN, Caltech, JAMES CHIANG, SLAC - Natl Accelerator Lab, MISLAV BALOKOVIC, Caltech, DAVID PANEQUE, Max-Planck Institut, AMY FURNISS, California State University, NUSTAR TEAM — Current scenarios for emission mechanisms operating in relativistic jets in AGN involve synchrotron emission for the radio through UV spectrum, and inverse Compton for hard X-rays through γ-rays, but the particle content of relativistic jets - whether they are dominated by proton-electron, or e+/e- plasma - has not been established. Our first hard X-ray observations with NuSTAR of the BL Lac type blazar PKS 2155-304, augmented by XMM-Newton data, reveal the 0.5-60 keV spectrum as best-described by a soft power law component dominating below ˜10 keV (photon index of ˜3 at 2 keV), and a hard power-law tail (index ˜2), dominating in the 20-60 keV range. The hard X-ray tail can be smoothly joined to the quasi-simultaneous Fermi/LAT γ-ray spectrum by a synchrotron self-Compton component produced by an electron distribution with index p=2.2. The jet content needs to (globally) obey charge neutrality; assuming that the power-law electron distribution extends down to the Lorentz factor of 1, and one proton per electron, yields an unrealistically high total jet power of 10^{47} erg/s. This can be reduced by two orders of magnitude by considering a significant presence of e+/e- pairs with lepton-to-proton ratio of at least 30.

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