

Cen A: Understanding the Nature of the Hard X-ray/Soft Gamma-ray Emission with INTEGRAL

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Status Update 2023

- Goal: Assess the origin of the hard X-ray/soft gamma-ray emission in the nearby, bright Active Galactic Nucleus Centaurus A using archival plus 2 years of Guest Observer data by the *INTEGRAL* satellite
- 2023 Activities:
 - 28 May – 2 June: Collaboration visit to Institut de Recherche en Astrophysique et Planetologie (IRAP) in Toulouse, France
 - 10 – 14 July: Presented initial results at European Astronomical Society meeting in Krakow, Poland
 - 26 July – 3 August: Presented initial results at International Cosmic Ray Conference in Nagoya, Japan
 - 27 October: Article published in ApJ using archival data and 1st year of observations
 - <https://doi.org/10.3847/1538-4357/acfc23>



Centaurus A: Exploring the Nature of the Hard X-Ray/Soft Gamma-Ray Emission with INTEGRAL

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Abstract

The question of the origin of the hard X-ray/soft gamma-ray emission in Centaurus A (Cen A) persists despite decades of observations. Results from X-ray instruments suggest a jet origin since the implied electron temperature (kT_e) would cause runaway pair production in the corona. In contrast, instruments sensitive to soft gamma rays report electron temperatures indicating that a coronal origin may be possible. In this context, we analyzed archival INTEGRAL/IBIS-ISGRI and SPI data and observations from a 2022 Cen A monitoring program. Our analysis does not find any spectral variability. Thus we combined all observations for long-term average spectra, which we compared with a NuSTAR observation to study the 3.5 keV–2.2 MeV spectrum. Spectral fits using a Comptonized blackbody with $kT_e \sim 550$ keV, near runaway pair production. The spectrum was also well described by a log-parabola and a synchrotron self-Compton emission from the jet. Additionally, a spectral fit with the 12 yr catalog Fermi-LAT spectrum using a log-parabola can explain the data up to ~ 3 GeV. Above ~ 3 GeV, a power-law excess is observed, which has been previously reported in LAT/H.E.S.S. analysis. However, including a coronal spectral component can also describe the data well. In this scenario, the hard X-rays/soft gamma rays are due to the corona and the GeV emission is due to the jet.

Unified Astronomy Thesaurus concepts: Active galactic nuclei (16); Gamma-rays (637)

ICRC2023
38th International Cosmic Ray Conference38th International Cosmic Ray Conference
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Presentation information



Parallel Session

GA16

Mon. Jul 31, 2023 9:00 AM – 10:30 AM Toyoda Auditorium Hall (Toyoda Auditorium)
Chair: Katsuaki Asano[Abstract](#) [Schedule](#) 13 [Comment \(0\)](#)9:00 AM – 9:15 AM [View Presenter supplemental information](#)

[GA16-01] Investigating the Nature of the Hard X-ray/Soft Gamma-ray Emission from Centaurus A Online

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Contributed talk Investigating the Nature of the Hard X-ray/Soft Gamma-ray Emission from Centaurus A (No. 733)

SS32d: Multiwavelength view on extragalactic jets

Galaxy evolution

Mon. 10th Jul. 18:00 - 18:15 S4 2 Room

Presenter

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