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

PI: James Rodi INAF-IAPS Roma

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

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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 a not find any spectral variability. Thus we combined all observations for long-term average spectra, whi with a NuSTAR observation to study the 3.5 keV-2.2 MeV spectrum. Spectral fits using a CompTT m $kT_e \sim 550 \,\mathrm{keV}$, near runaway pair production. The spectrum was also well described by a log-parabol synchrotron self-Compton emission from the jet. Additionally, a spectral fit with the 12 yr catalog FP > Timetable > Mon. Jul 31, 2023 > Session information > Presentation information spectrum using a log-parabola can explain the data up to \sim 3 GeV. Above \sim 3 GeV, a power-law excess energy information which has been previously reported in LAT/H.E.S.S. analysis. However, including a coronal spectral can also describe the data well. In this scenario, the hard X-rays/soft gamma rays are due the corona an to GeV emission is due to the jet.

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

38th International Cosmic Ray Conference The Astroparticle Physics Conference Presentation information

Mon. Jul 31, 2023 9:00 AM - 10:30 AM Toyoda Auditorium Hall (Toyoda Audi

[GA16-01] Investigating the Nature of the Hard

X-ray/Soft Gamma-ray Emission from Centaurus

(Schedule 13 Comment (0)

View Presenter supplemental information

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Parallel Session

Chair:Katsuaki Asano

9:00 AM - 9:15 AM

*Iames Rodi1 (1.INAF - IAPS)

| ↓ Abstract

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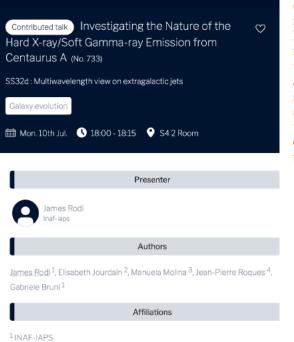
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