From Multiwavelenth Data to Electron Distribution

Xianglong Song

Boling Class of Physics, School of Physics, Nankai University, Tianjin 300071, China

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Contents

Introduction

The Crab Nebula

The first identified source beyond 100 TeV, even PeV

Figure: Crab Nebula imaged using James Webb Space Telescope in infrared via its NIRCam (Near-Infrared Camera) and MIRI (Mid-Infrared Instrument)[1].

Introduction of Naima

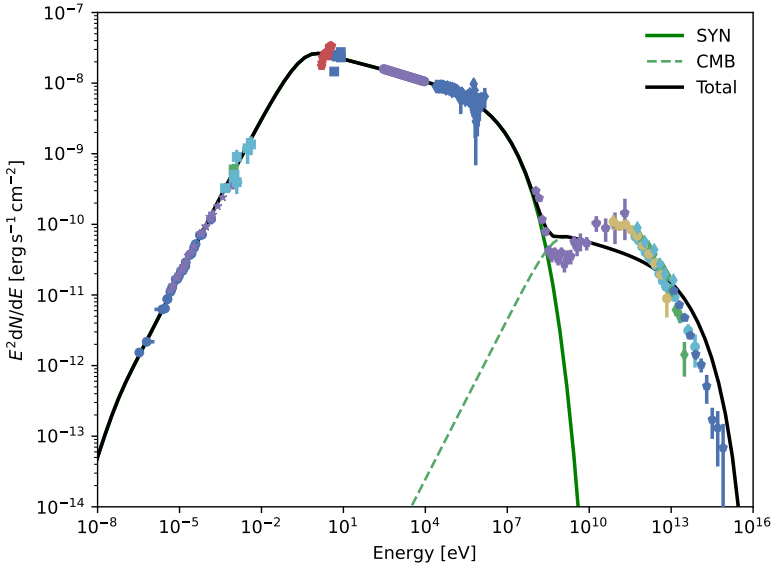
Naima

Naima is a Python package for computation of non-thermal radiation from relativistic particle populations. It includes tools to perform MCMC fitting of radiative models to X-ray, GeV, and TeV spectra using emcee, an affine-invariant ensemble sampler for Markov Chain Monte Carlo. Naima is an Astropy affiliated package[2].

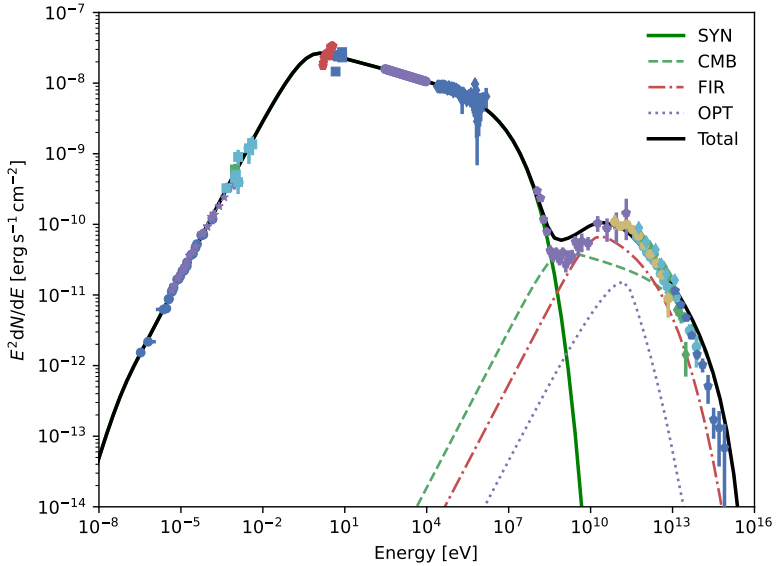
Some Physics

- Synchrotron Radiation
- Inverse Compton Scattering
- Pion Decay

Exponential Cutoff Broken Power Law for Electron Distribution



(a) Only including CMB distribution for synchrotron part.



(b) Adding inverse compton distribution for synchrotron part.

Figure: Why do we need more than CMB for the Crab Nebula.

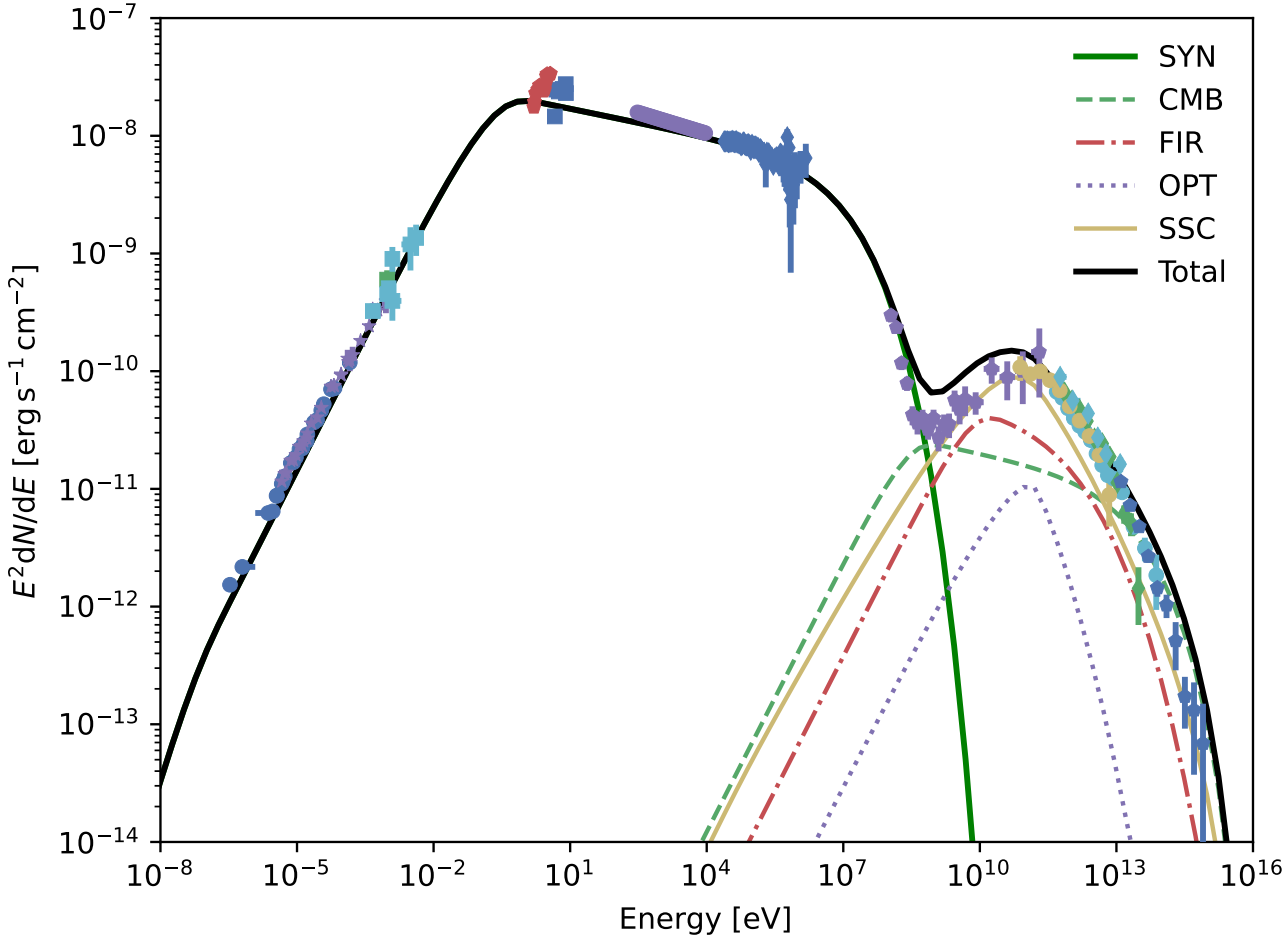


Figure: Consider the distribution of Self Synchrotron Compton.

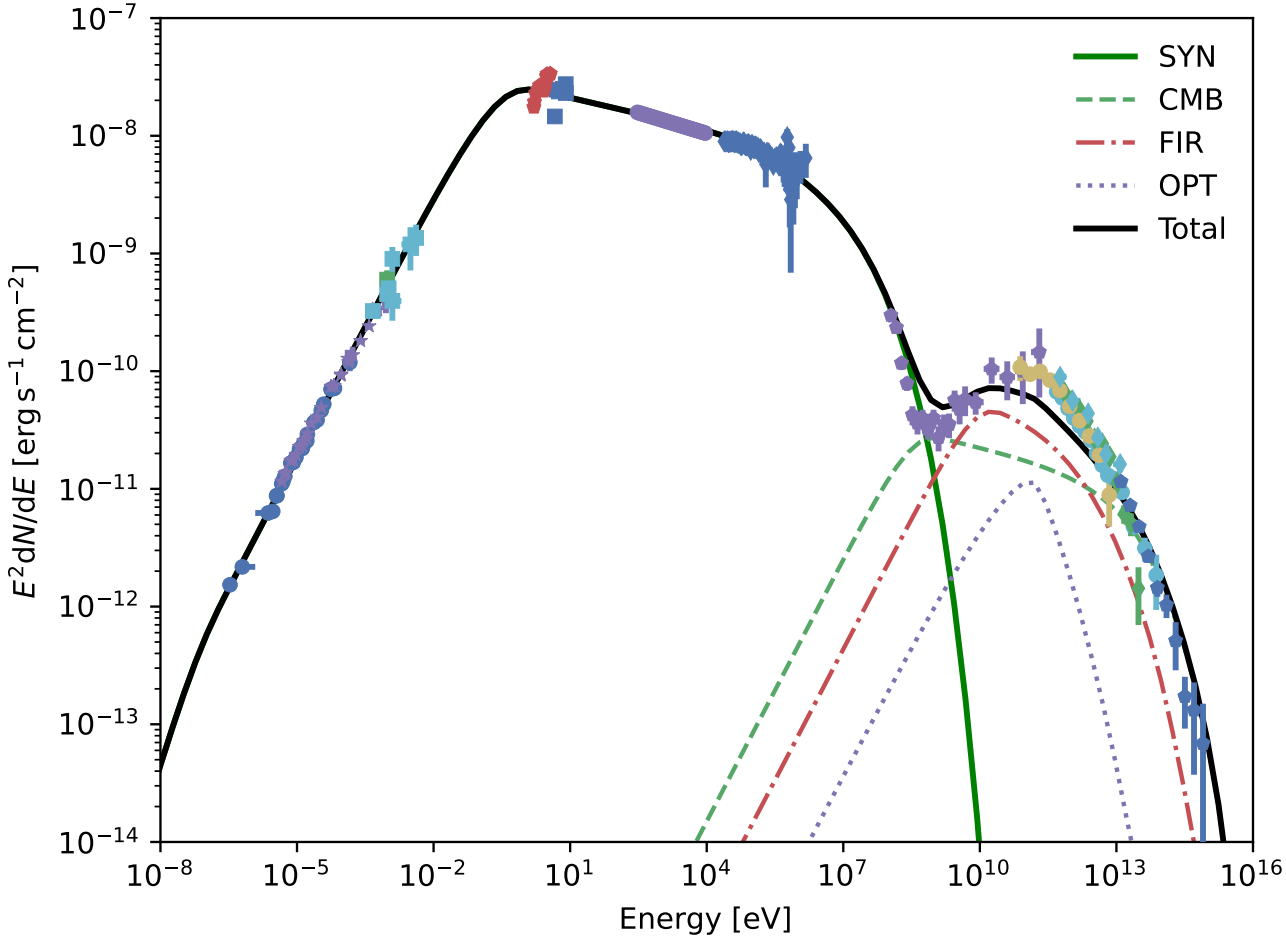
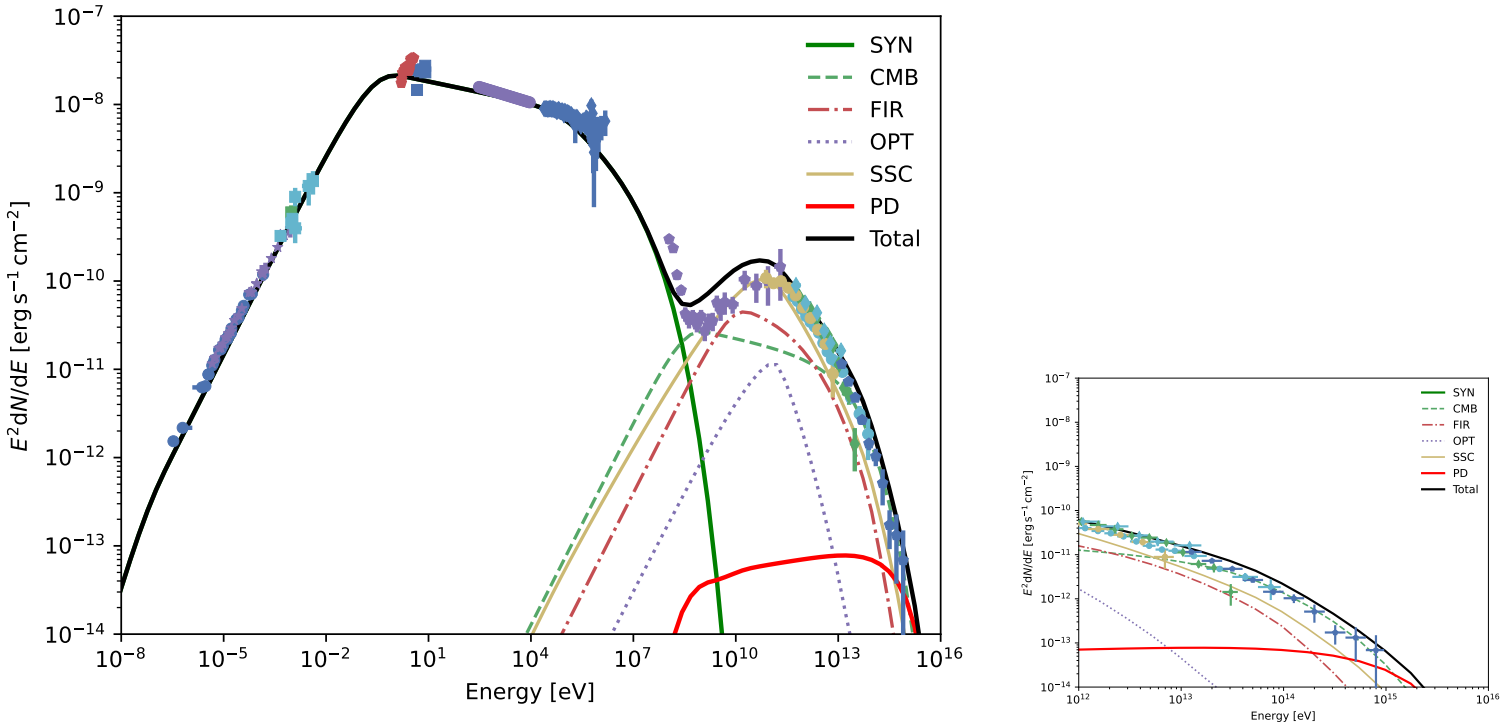


Figure: Consider the ExponentialCutoffDoubleBrokenPowerLaw.



(a) (b)

Figure: Consider the Pion Decay distribution.

Wikipedia contributors.
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https://en.wikipedia.org/w/index.php?title=Crab_Nebula&oldid=1198233112, 2024.
[Online; accessed 25-January-2024].

V. Zabalza.
naima: a python package for inference of relativistic particle energy distributions from observed nonthermal spectra.
Proc. of International Cosmic Ray Conference 2015, page 922, 2015.