

Lab AA652

Experiment 5

SED Modeling

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1 Objective

To find the bestfit **S**pectral **E**nergy **D**istribution (SED) model parameters for the given Synchrotron peak and IC peak data .

2 Data with fitted model and model parameters

2.1 Synchrotron Peak

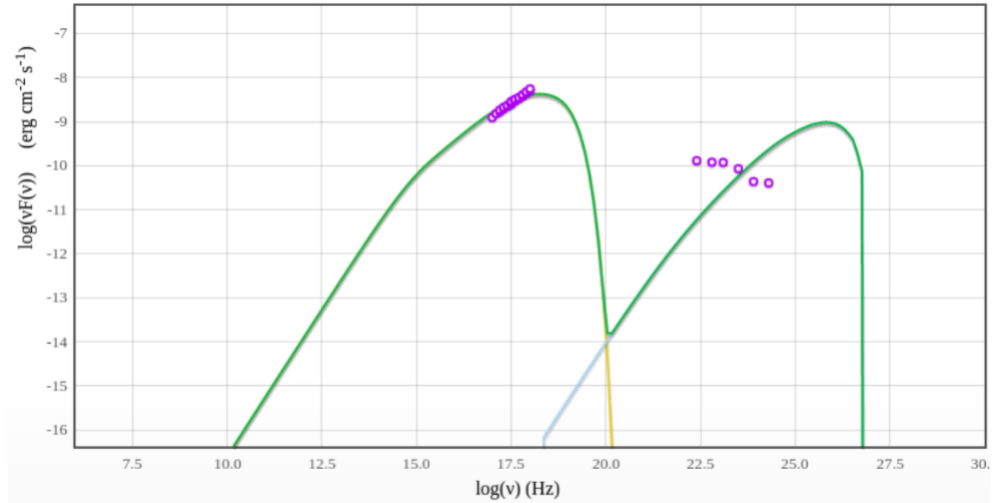


Figure 1: The SED model plot with fitted Synchrotron peak

The model parameters for the above figure are:

1. Radius of the emitting region in the jet is about $1 \times 10^{16} \text{cm}$ (~ 2 lightdays)
2. Redshift of the host galaxy is $z=1.0$
3. Bulk Lorentz factor $\Gamma=30$.
4. Viewing angle $\theta=0.1\text{deg}$
5. Magnetic field at the emission site, $B=1.5$ Gauss.
6. Electron density $=1.0/\text{cm}^3$
7. $\gamma_{\min}=2 \times 10^3$
8. $\gamma_{\max}=2 \times 10^5$

And the electron distribution is a broken power law with the lower energy spectral index $=1.5$ and the higher one 2.5 with the energy break (γ_{break}) at 50000 . Synchrotron self-absorption emission mechanism

has been adopted here with inverse comptonization of the synchrotron photons(SSC).

2.2 IC Peak

The second peak corresponds to the high energy(gamma-ray) **I**nverse **C**ompton radiation from the emission site. The second peak is fitted with another model in the following figure.

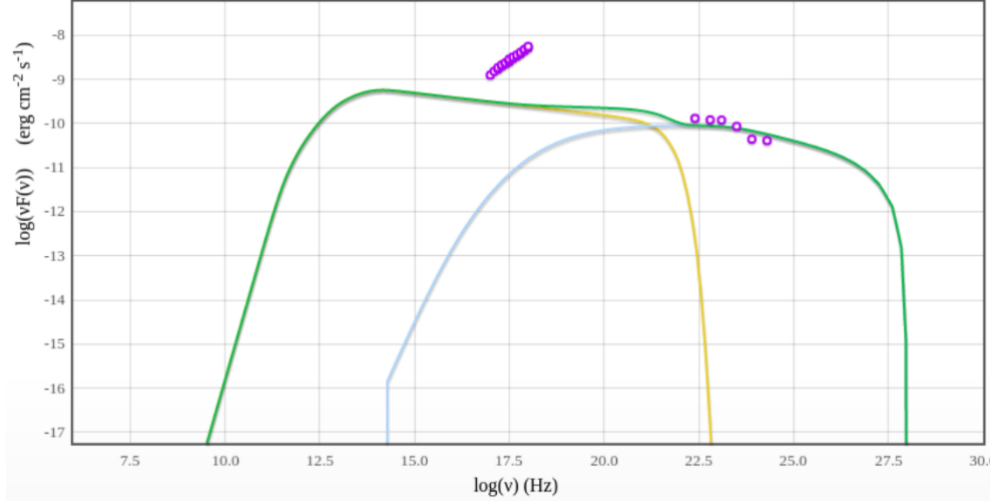


Figure 2: The IC peak fitted with SED model

The optimum parameters found for the above fitting are listed below,

1. Radius of the emitting region in the jet is about $1 \times 10^{16} \text{ cm}$ (~ 2 lightdays)
2. Redshift of the host galaxy is $z=1.0$
3. Bulk Lorentz factor $\Gamma=30$.
4. Viewing angle $\theta=0.1 \text{ deg}$
5. Magnetic field at the emission site, $B=3.5$ Gauss.
6. Electron density $=200/\text{cm}^3$
7. $\gamma_{\min}=100$
8. $\gamma_{\max}=3 \times 10^6$

And the electron distribution is a broken power law with the lower energy spectral index $=1.9$ and the higher one 3.2 with the energy break (γ_{break}) at 400 . Synchrotron self-absorption emission mechanism has been adopted here with inverse comptonization of the synchrotron photons(SSC).