**cdf\_plot Instruction Document**

This code is mainly used to read scientific data files in CDF format and plot heatmaps of "total counts per energy channel" for each bitstring as a function of time and energy channels. Two functions are provided:

1. plot\_cdf\_heatmap: Suitable for simplified data format with shape (10, 16, 45).
2. plot\_cdf\_mult\_heatmaps: Suitable for more complex data formats, such as (10, 6, 7, 16, 45)

**plot\_cdf\_heatmap** **Function Description**

**Function Definition and Parameters:**

def plot\_cdf\_heatmap(cdf\_path):

* cdf\_path: A string indicating the file path of the CDF file.

**Loading the Data:**一張含有 文字, 螢幕擷取畫面, 字型 的圖片

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This section uses the pycdf module from the SpacePy library to read the CDF file. Specifically:

* total\_counts\_all: The energy channel count data for 10 bitstrings, with 16 energy channels and 45 time points in total.
* epoch: The data representing the corresponding time.

**Processing the Time Format:**一張含有 文字, 螢幕擷取畫面, 字型 的圖片

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The time data is converted from timestamps to datetime format (e.g. YYYY/MM/DD/hh:mm) for easier plotting along the X-axis.

**Plotting:**一張含有 文字, 螢幕擷取畫面, 字型 的圖片

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Ten subplots (one for each bitstring) are generated. Each subplot shows the variation in energy channel counts for that bit and uses imshow to display a heatmap with logarithmic scaling. The plot is as follows:

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**plot\_cdf\_mult\_heatmaps** **Function Description**

**Function Definition and Parameters:**

def plot\_cdf\_mult\_heatmaps(folder\_path, save\_dir=None):

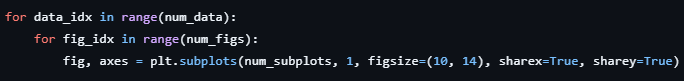
* folder\_path: A string indicating the folder path which contains cdf files.
* save\_dir: A string indicating the folder path which saves images from the function.

This function handles multiple observation sample data:

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If the data is not five-dimensional, it will first be reshaped into the format (1, x, y, 16, 45) for consistent processing.

**Generating Multiple Observation Sets with Nested Loops:**

Each time, a heatmap containing 7 subplots will be drawn, a sample plot is as follow.

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