HIPS Cutout Viewer User Guide

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Project repository: `https://github.com/yogeshw/HIPSCutoutViewer`

1 Introduction

The HIPS Cutout Viewer is a graphical application for retrieving and displaying astronomical image cutouts from various sky surveys using the Hierarchical Progressive Survey (HiPS) system.

2 System Requirements

- Python 3.6 or later
- Required packages: PyQt6, astropy, astroquery, matplotlib
- Internet connection for accessing astronomical databases

3 Getting Started

3.1 Launch the Application

To start the application, run:

```
python hips_cutout_viewer.py
```

4 Main Interface

The interface consists of several key areas:

4.1 Input Section

- **Object Name:** Enter the name of an astronomical object (default: "M 51")
- **RA/Dec:** Direct input of coordinates in decimal degrees
- **Size:** Field of view in degrees (default: 0.1)
- **Resolve Name:** Button to obtain RA/Dec coordinates of chosen object using Simbad

4.2 Survey Selection

- **Available Surveys:** Dropdown list of all available HiPS surveys
- **Selected Surveys:** List of surveys chosen for cutout retrieval
- **Survey Ordering:** Use ↑/↓ buttons to change the order of selected surveys
- **Default Surveys:** The following surveys are loaded by default:
  - CDS/P/2MASS/color
  - CDS/P/HST/EPO
  - CDS/P/SDSS9/color
- Use "Add →" and "← Remove" buttons to manage survey selection

4.3 Action Buttons

- **Get Cutouts:** Retrieve images for selected surveys
- **Save Collage:** Save the displayed images as a PNG or JPEG collage (PNG recommended for better quality)
- **Download FITS:** Save FITS format files for the cutouts
- **Reset:** Reset to default object (M 51) and default surveys while clearing other inputs

5 Workflow

1. Enter an object name or coordinates
2. If using a name, click "Resolve Name" to get coordinates
3. Select desired surveys from the dropdown menu
4. Adjust the cutout size if needed
5. Click "Get Cutouts" to retrieve images
6. Optionally save the collage or download FITS files

6 Features

6.1 Image Display

- Images are displayed in a grid layout
- Each image includes:
  - North-East orientation arrows
  - Scale bar (1 arcminute)
  - Survey identification

6.2 FITS Downloads

- FITS files are saved in a 'fits' subdirectory
- Files are named according to their survey ID
- WCS information is preserved for scientific analysis

7 Troubleshooting

- **Object Not Found:** Verify the object name in SIMBAD database
- **No Images:** Check if the selected surveys cover the requested region
- **Download Errors:** Verify internet connection and coordinates

8 Tips

- The default object M 51 (Whirlpool Galaxy) provides a good starting point for exploring the interface
- Default surveys are preserved when using the Reset button
- Start with well-known objects to familiarize yourself with the interface
- Use smaller field of view values for detailed views
- Select complementary surveys for multi-wavelength analysis
- Use PNG format when saving collages for best image quality
- JPEG format is available but may show compression artifacts

9 Technical Support

For technical issues, feature requests, or contributions, please visit the project repository at:
`https://github.com/yogeshw/HIPSCutoutViewer`

You can submit issues, suggest improvements, or contribute to the development through pull requests. I don't have much bandwidth to work on this, so pull requests will receive the most attention!

10 License

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