Goodman HTS Pipeline User Manual

version 0.10

Simón Torres, César Briceño and Bruno Quint

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Contents

Introduction

This is the User Manual for the *Goodman Spectroscopic Data Reduction Pipeline*. It provides an overview of the pipeline's main features, instructions on its use and how to run it on our dedicated *Data Reduction Server*, and installation instructions for those who wish to run it on their own computers.

License

License is under discussion

Overview

The Goodman Spectroscopic Data Reduction Pipeline - *Goodman Pipeline* - is a Python-based package for producing science-ready, wavelength-calibrated, 1-D spectra. The goal of *Goodman Pipeline* is to provide SOAR users with an easy to use, very well documented software for reducing spectra obtained with the Goodman spectrograph. Though the current implementation assumes offline data reduction, our aim is to provide the capability to run it in real time, so 1-D wavelength calibrated spectra can be produced shortly after the shutter closes.

The pipeline is primarily intended to be run on a data reduction dedicated computer. Instructions for running the software are provided in the Running Pipeline section of this guide. The Goodman Spectroscopic Data Reduction Pipeline project is hosted at GitHub at it's GitHub Repository.

Currently the pipeline is separated into two main components. The initial processing is done by `redccd`, which trims the images, and carries out bias and flat corrections. The spectroscopic processing is done by `redspec` and carries out the following steps:

- Identifies multiple targets (spectra of more than one object in the slit)
- Trace the spectra
- Extract the spectra
- Estimate and subtract background
- Saves extracted (1D) spectrum, without wavelength calibration.
- Find the wavelength solution. Defaults to automatic wavelength solution, but can be done interactively
- Linearize data (resample)
- Write wavelength solution to FITS header
- Create a new file for the wavelength calibrated 1D spectrum

Features Available

- Self-contained, full data reduction package for the most commonly used predefined setups with Goodman HTS. Given the almost limitless number of possible configurations available with the Goodman instrument, only the most popular configurations will be supported, though we will try to add as many modes as possible.
- Python based, using existing Astropy libraries as much as feasible.
- Extensively documented, using general coding standards: PEP8 – Style Guide, PEP257 – Docstrings Convention (in-code documentation) – Google Style
- Multiplataform compatibility (tested on Linux Ubuntu, CentOS and MacOSX).
- Modular design. Could be used as a library within other Python applications.

Supported Data

To write

Future Implementation

To add

Requirements

Data Requirements

The Goodman High Throughput Spectrograph's data has seen some evolution in the past years in shape and most importantly in its headers. The *Goodman Pipeline* relies heavily on the data's header so this in fact very important.

Data Format

Header Format

Reference Lamp Files

File organization

Software Requirements

software #*^~-

Setup for Remote Use

Setup for local installation

DCR (optional)

System Installation (not recommended)

Conda Installation

New Virtual Environment

Existing Virtual Environment

Running the Pipeline

Working with Virtual Environments

Prepare Data for Reduction

redccd

redspec

Conclusion

Performance

Benchmarks

(Time elapsed)

Wavelength Calibration

Comparison with IRAF

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Known Issues