# MYRAF: A NEW APPROACH WITH IRAF FOR ASTRONOMICAL PHOTOMETRIC REDUCTION

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### RESUMEN

Se presenta el diseño y desarrollo del logical (software) MYRaf para la reducción fotométrica. El programa MYRaf es fácil de usar, robusto y tiene un modo de fotometría de apertura basado en IRAF y herramientas GUI. El programa MYRaf es un paso importante para el procesado automático de telescopios robóticos y usa IRAF, PyRAF, matplotlib, ginga, alipy, and Sextractor con el objetivo genérico y lenguaje Python de programación de alto nivel en entorno QT.

### ABSTRACT

In this study, the design and some developments of MYRaf software for astronomical photometric reduction are presented. MYRaf software is an easy to use, reliable, and has a fast IRAF aperture photometry GUI tools. MYRaf software is an important step for the automated software process of robotic telescopes, and uses IRAF, PyRAF, matplotlib, ginga, alipy, and Sextractor with the general-purpose and high-level programming language Python and uses the QT framework.

*Key Words:* methods: data analysis — techniques: photometry

## 1. INTRODUCTION

Photometric observation data basically is value of wanted area in matrix of observed part of sky and can be handled with image processing methods. In a photometric observation data there is some predicted defect. Removing these kind of defects and extracting needed data from image matrix as whole process can be a description for Photometric Data Reduction.

## 2. METHOD

The main objective of MYRaf is to be a powerful and easy to use tool for photometric data reduction. For this purpose, MYRaf uses IRAF[5] (V2.14 or higher). PyRAF[6] (V2.0 or higher) has been used to control IRAF over Python. Malte Tewes's alipy (V2) is our main dependency for aligning CCD images. SExtractor and astroasciidata aslo used for matching objects on CCD images (Bertin & Arnouts 1996). MYRaf v2.0 Beta uses ginga for displaying FITS images with the matplotlib backend (Jeschke 2013). All

of tools metioned are come together and and organized by Python[7] (V2.7) and Qt[8] (V4) to create a Graphical User Interface for photometric data reduction with reliability and strength of IRAF.
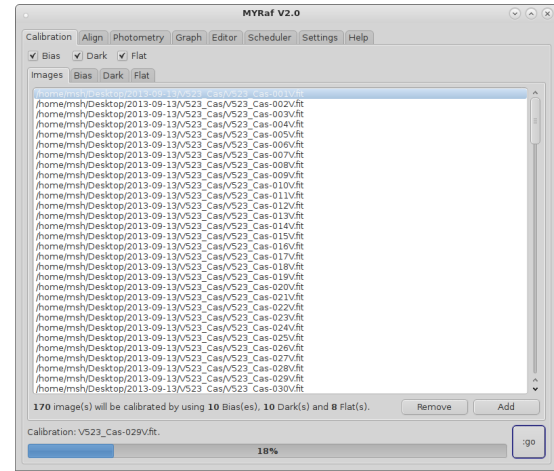
## 3. MYRAF



Fig. 1. MYRaf Calibration Tab

MYRaf's calibration tab shown in Figure 1 does IRAF calibration such as Bias, Dark or Flat correction. MYRaf also can recognize filters used for Flat files and combine them separately and can scale the Dark files according to exposure time.

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[5]https://goo.gl/xWpfRO
[6]https://goo.gl/RPcBXU

[7]https://goo.gl/y1rOIo
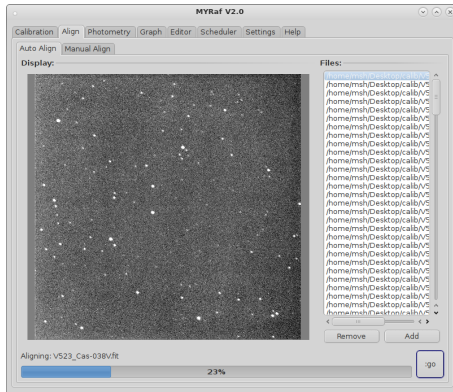[8]https://goo.gl/TfRvvK

Fig. 2. MYRaf Alignment Tab

Figure 2 shows Alignment tab in MYRaf that can be done in two ways. Automated alignment which uses Alipy[9] V2.0 and Manual alignment special Alignment need such as near earth objects.
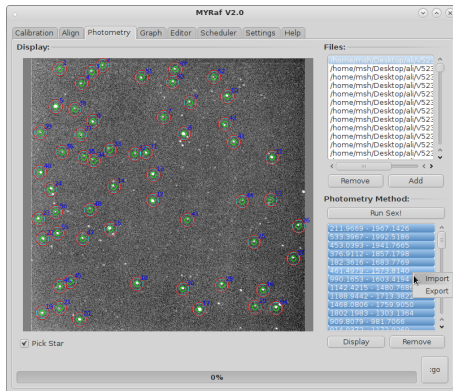


Fig. 3. MYRaf Photometry Tab

As shown in figure 3 MYRaf photometry have multi-object photometry, source finder features and uses IRAF phot task to extract values from data file.
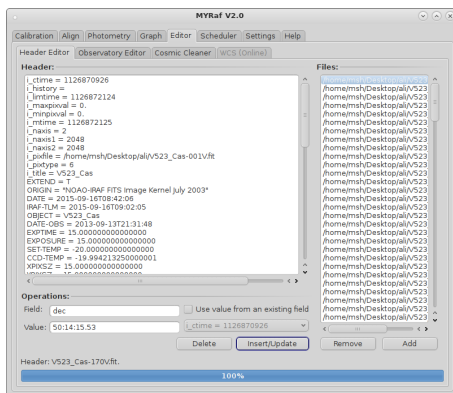


Fig. 4. MYRaf Header Editor Tab

[9] https://goo.gl/2aI6Tc

Figure 4 is MYRaf Header Editor. Header editor can basically create, update or delete cards in headers for given files. This tab uses IRAF imhead task.
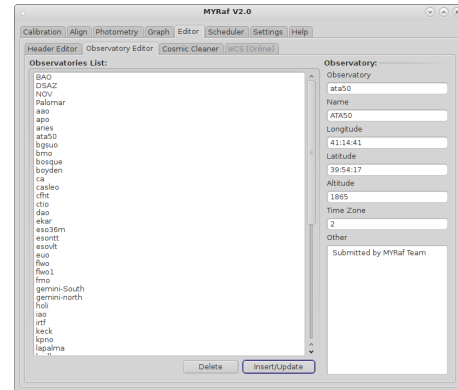


Fig. 5. MYRaf Observatory Editor Tab

MYRaf Observatory Editor (Figure 5) gives a possibility to add, remove and edit IRAF's observatory database. It's basically a simple text file which has a structure to fallow.
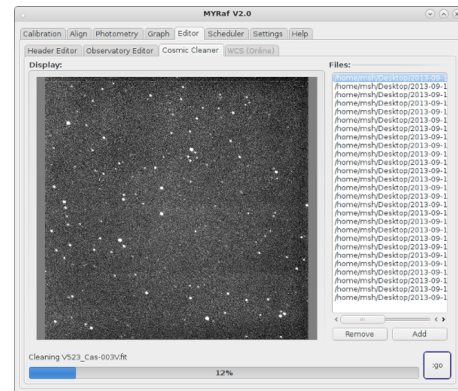


Fig. 6. MYRaf Cosmic Ray Cleaner Tab

Figure 6 shows MYRaF's Cosmic Cleaner[10] tab. Here user can delete cosmic ray effects on fits files. As shown in Fig. 1, 2, 3, 4 and 5 MYRaF is a useful tool for IRAF Photometry and all of its components such as calibration, alignment etc placed in a logical order to do an apperture photometry. MYRaf basically gives a modern Graphical User Interface to IRAF's old Text User Interface.

[10] https://goo.gl/wpKQlN