ABISM: an interactive image quality assessment tool for adaptive optics imaging

SPIE. CONNECTING MINDS. ADVANCING LIGHT.
Astronomical Telescopes + Instrumentation
Montréal June 30th 2016
Contribution 9909-303

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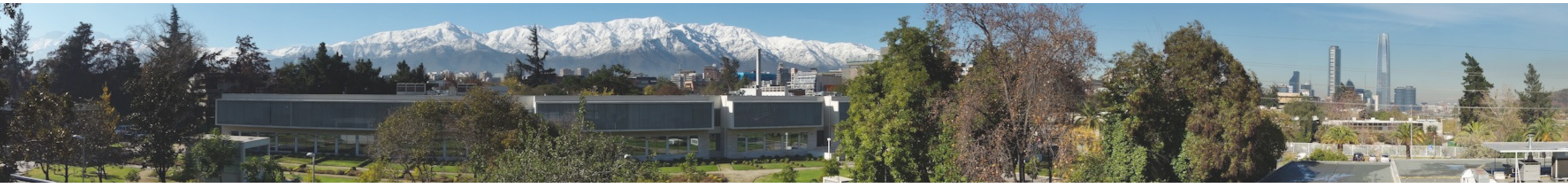


ABISM: Automatic **B**ackground **I**nteractive **S**trehl **M**eter

ABISM was mainly developed between 2012 and 2014 as a prototype program to ease the QC0 (immediate Quality Control) classification of Adaptive Optics (AO) data in the framework of SciOps 2.0[1]

A big effort was also put to make ABISM as robust (and forgiven) with a high rate of repeatability. As a matter of fact, ABISM is able to automatically correct for bad pixels, eliminate stellar neighbours and estimate/fit properly the background.

ABISM uses a "class" for each instrument different settings can be automatically set to the operator/user does not have to see the most complex settings (available from the GUI menus as shown below on the commented screenshot):

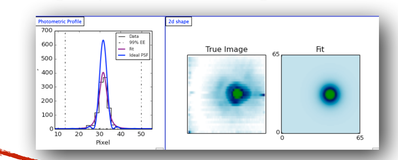
It's a **Python**-based tool with a graphical user interface (GUI) that can be used with little AO knowledge. The night astronomer (NA) or Telescope and Instrument Operator (TIO) can launch ABISM easily from Gasgano[2] and the program is able to read keywords from the FITS header to avoid mistakes and smoothen the nighttime operations.

Main features

- 2D fitting (anamorphism)
  Moffat, Gaussian, Bessel, no-fit
- Binary fitting for astrometry
  Position angle, flux ratio
- Contours
  PSF morphology comparison
- Companion rejection
  Crowded fields!

Image box

- Median filtering, bad pixel mitigation
  Raw data for most modes (center image)
- Smart background options
  Integrafield Spectrograph reconstructed images (eg. SINFONI)
  Edge objects (draa the background box)



Compass North/East if WCS detected

Flux (ADU) for any given mouse pointing

Defaut Matplotlib options
Zoom, Pan, Save image, etc.

Comparison box (fit/data)

Developped at the VLT/ SciOps PROJ-0003

Menus

Automatic detection (FITS Header)
- Obs/Tel/Instrument
- DATA format
- WCS
- Message if saturation/non-linearity levels are reached
- Reads cubes frame by frame

File box

Manual cuts
(optional)
Lin/Log/Square scale

From FITS header
- Central wavelength
- Pixel Scale

From VLT "class"
- Diameter
- Central Obstruction

Parameter box

Background options
- Annulus, rectangles, fit, none

Photometry options
- Elliptical/rectangle apertures
- Fit
- Manual

Fit options
- Anisomorphism (PSF shape)

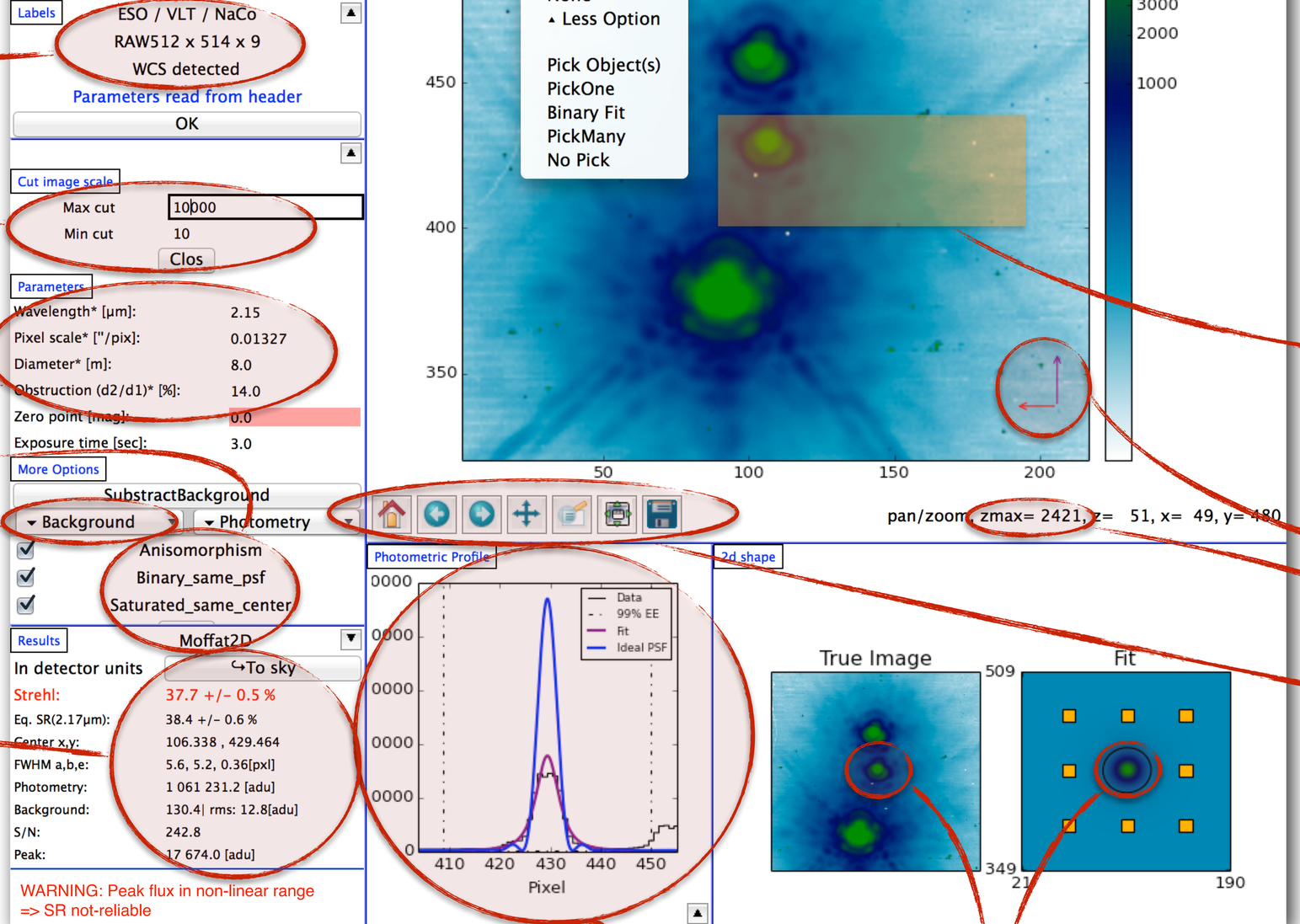
Options box

Strehl Ratio
- for central wavelength
- Equivalent SR at 2.17µm for classification
- Error bars based on Fit/background/SNR
- FWHM/position in both detector and sky coordinates
- Optional photometric calibration (if ZP provided)

Results box

Warnings
- Pixel scale > 0.5xλ/D (Shannon)
  => undersampled, SR unreliable, please use FWHM
- Saturated/Non-linear
  => SR not reliable
- Low SNR
  => low SNR, mind the uncertainties

Warning box



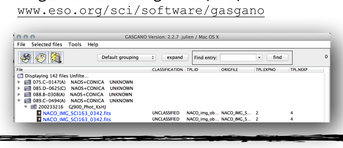
Profile box

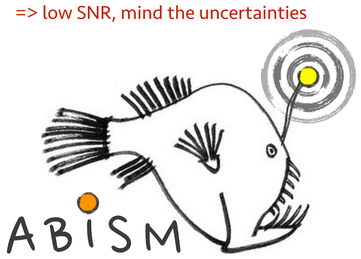
Didactic 2-D profile
- automatic detection of 99% EE radius
- data fit
- theoretical PDF with same photometry

Middle star of triple system fitted
- automatic rejection of neighbours
- median background out of 8 square (orange) boxes

[1] SciOps 2.0: operations model at the Paranal Observatory in which the astronomer leaves the console between 2 and 4am (Dumas et al. in this conference, paper 9149-52)

[2] Gasgano:Data File Organiser (ESO)
www.eso.org/sci/software/gasgano





Measure the **Strehl ratio** in one click!