LUS

The OSIRIS-GTC "Local Universe Survey"

Gas outflows kinematics with OSIRIS TF
A feasibility study

Jairo Méndez-Abreu on behalf of the LUS collaboration

VIII Workshop "Estallidos de Formación estelar en galaxias"
Salobreñas, March 7-10 2010

LUS: Scientific Aims

GENERAL

To obtain 2D distribution of stellar ages and metallicities over the entire surface of the galaxy using the unique combination of size GTC and OSIRIS tunable filters to obtain high S/N, high angular resolution narrow band maps in selected emmission lines and continua.

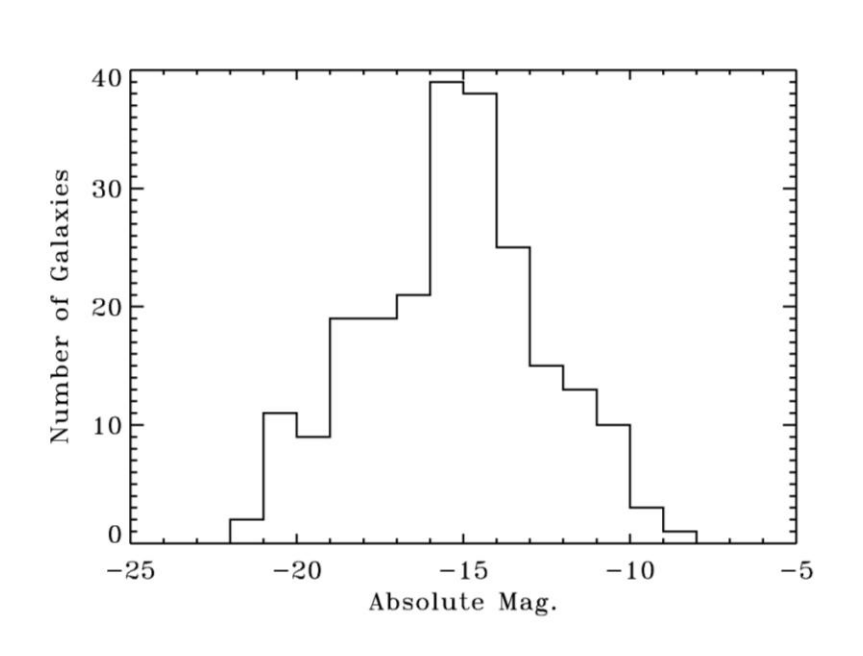
SPECIFIC

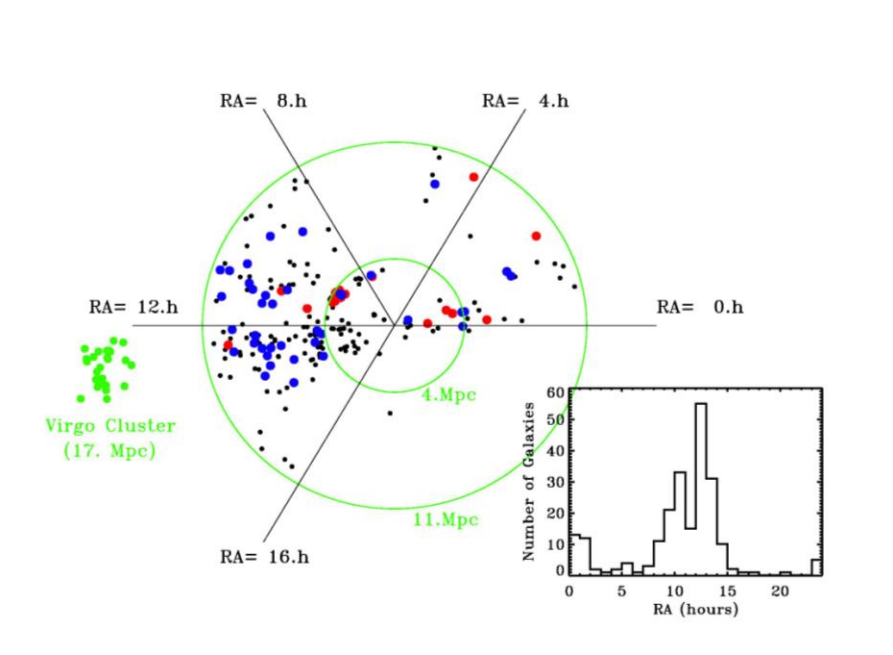
- Mapping the star formation history of individual galaxies
- High resolution BPT-diagram analysis
- Mapping the metallicity distribution in discs
- Massive compact Star Clusters in the nuclear and circumnuclear regions of normal galaxies
- Feedback: the interaction between massive stars and the ISM
- Detection and quantification of the difuse ionized gas in galaxies
- Star-formation in low-density environments

LUS: Galaxy Sample

- All galaxies inside a volume of 3.5 Mpc radius
- All irregulars and spirals inside a volume of 11 Mpc
- Sample of the Virgo Cluster (26 galaxies)

224 Galaxies





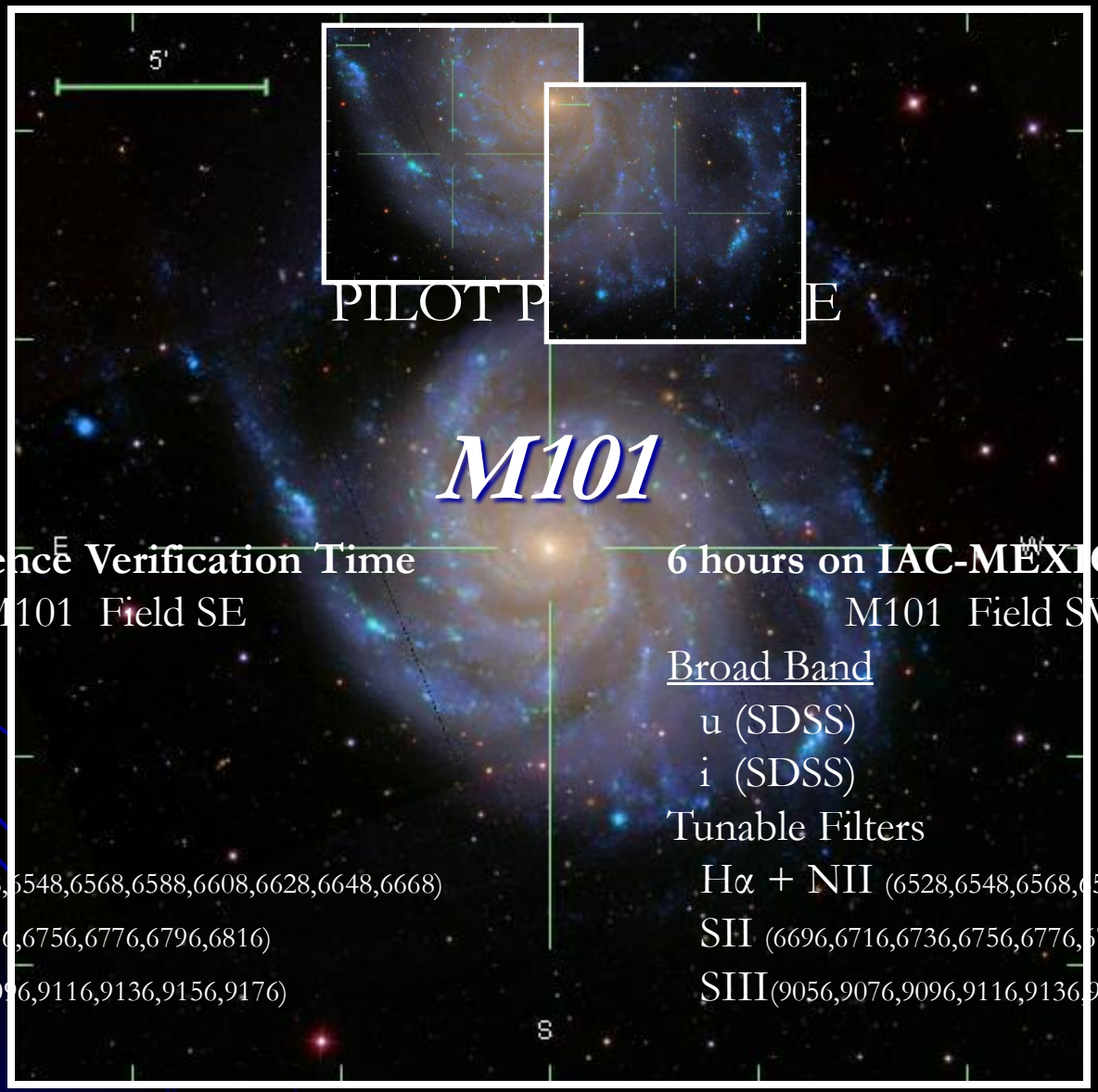
LUS: Team

PIs: J.M. Rodriguez Espinosa & R. Terlevich

More than 60 researchers and PhD students mainly from the "Estallidos de formación estelar" and "Consolider: Science for the first light of GTC" collaborations.

More information at:
http://www.inaoep.mx/~gtc-lus/

LUS: Time allocated & Status of the data



6 hours on Science Verification Time

M101 Field SE

Broad Band

u (SDSS)

i (SDSS)

Tunable Filters

Hα+ NII (6528,6548,6568,6588,6608,6628,6648,6668)

SII (6696,6716,6736,6756,6776,6796,6816)

SIII (9056,9076,9096,9116,9136,9156,9176)

6 hours on IAC-MEXICO

M101 Field SW

Broad Band

u (SDSS)

i (SDSS)

Tunable Filters

Hα + NII (6528,6548,6568,6588,6608,6628,6648,6668)

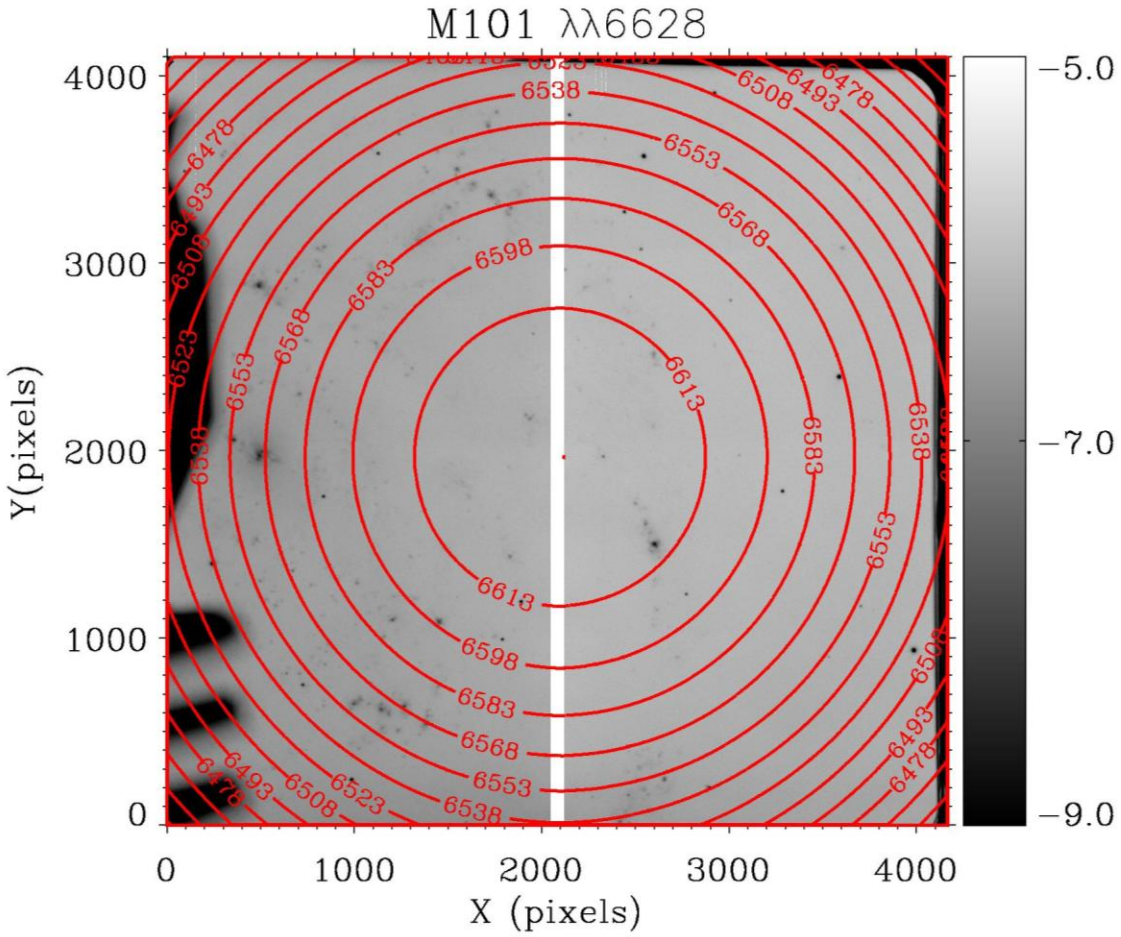
SII (6696,6716,6736,6756,6776,6796,6816)

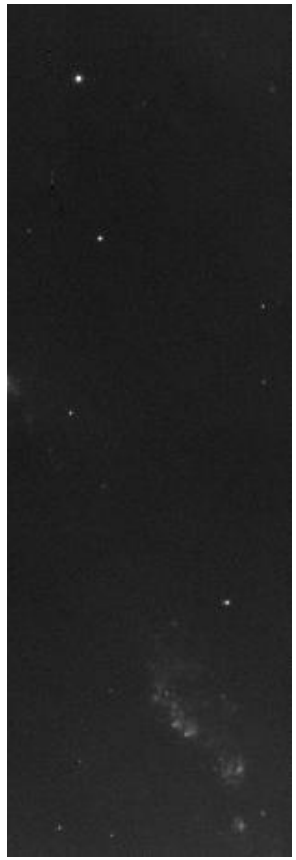
SIII (9056,9076,9096,9116,9136,9156,9176)

www.iac.es/consolider-ingenio-gtc

LUS: The OSIRIS-GTC "Local Universe Survey"

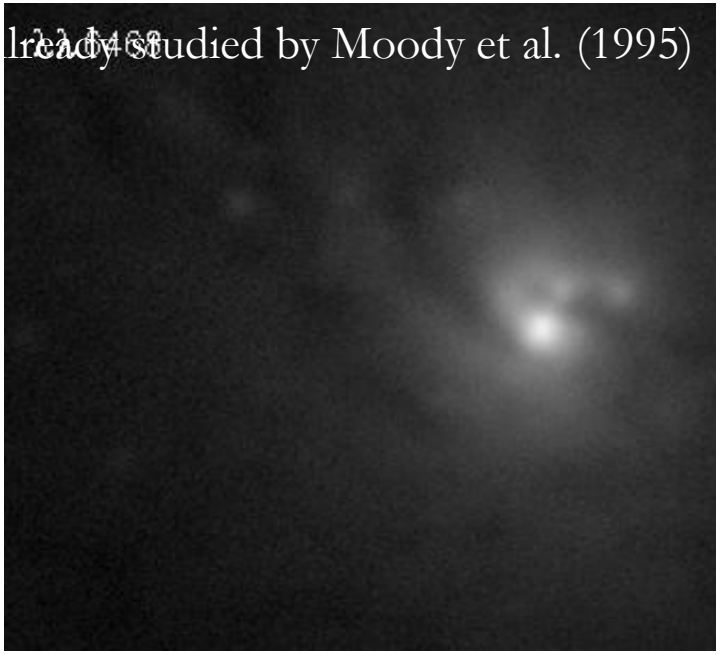
LUS: Tunable Filter Images





LUS: Identifying Ionized Structures with OSIRIS TF

KNOTS AND RINGS AT THE CENTER M101



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EVIDENCE FOR MASS OUTFLOW FROM THE NUCLEUS OF M101: KNOTS, RINGS, AND A GEYSER

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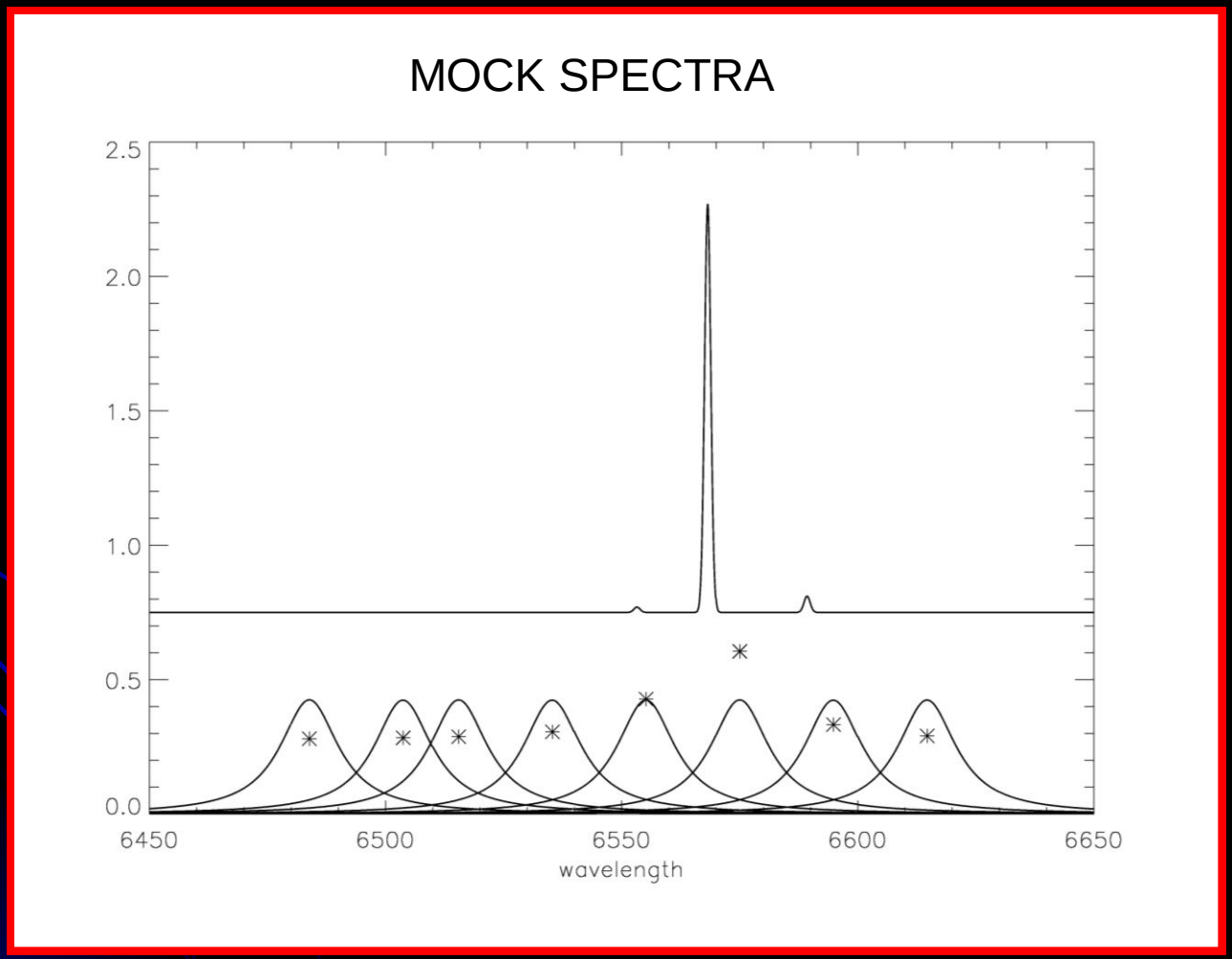
ABSTRACT

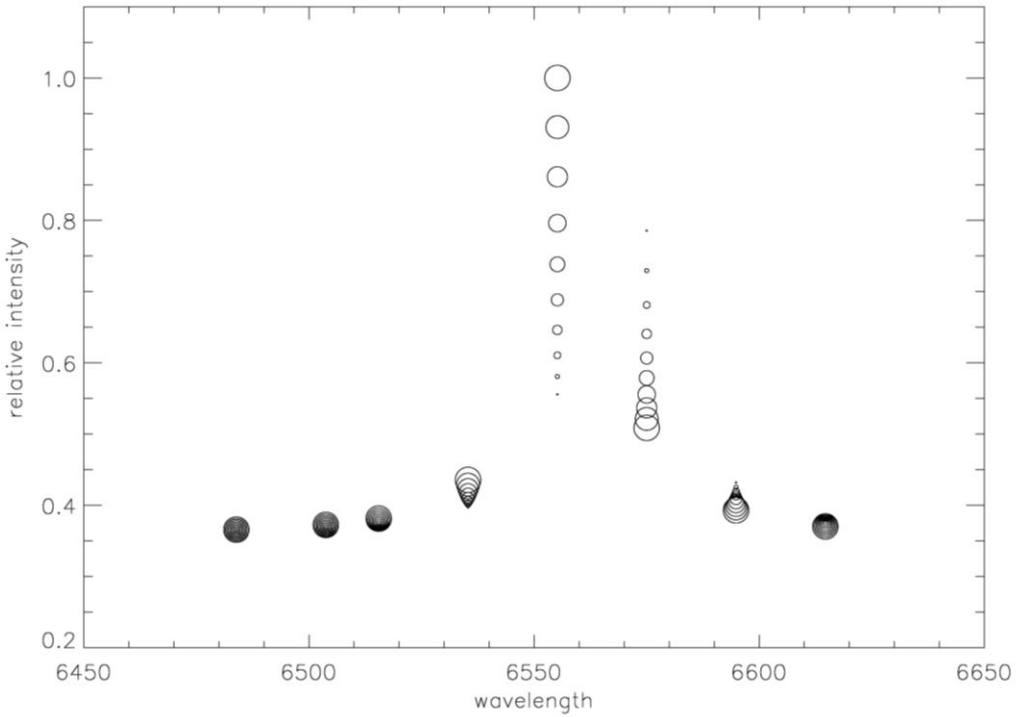
Hα on-line and off-line CCD images of M101 obtained with the Canada–France–Hawaii 3.6 m telescope show the presence of two Hα bright, filled knots paired linearly across the nucleus in a north–south orientation. The knots are centered 2.4″ (85 pc, assuming a distance to M101 of 7.4 Mpc) from the nucleus and lie roughly perpendicular to an east–west molecular bar. Each knot in turn is connected to an elongated, photoionized ring lying parallel along the bar. The eastern ring, connected to the southern knot, reaches outward in a well-defined 500×200 pc oval. The 700×300 pc western ring, connected to the northern knot, is more broken and dissipated in the middle. An arc containing blue stars and/or significant Hα absorption lies along the southern side of a dust lane extending from the nucleus westward along the bar. *Hubble Space Telescope* Planetary Camera image data show pockets of star-forming regions to the east and to the south of the nucleus which are associated with the knot and ring in that half. The imaging data, together with velocity data obtained with the Coude' feed spectrometer at Kitt Peak National Observatory show that the knots and rings are likely a bipolar outflow originating from a velocity <100 km s^{-1} "geyser" which has a period of approximately 22 million years and is located in the nucleus. The geyser may be caused by a mass $<10^6$ $\mathcal{M}_\odot$ black hole orbiting within the nucleus, sweeping material from the molecular bar.

LUS: Kinematics of Ionized Structures with OSIRIS TF



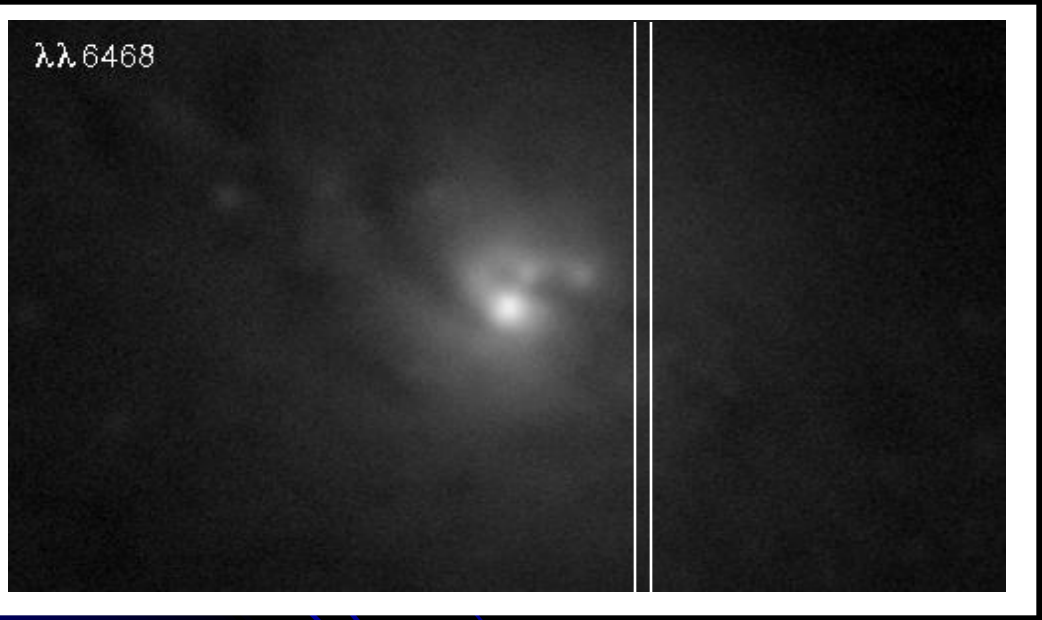
LUS: Kinematics of Ionized Structures with OSIRIS TF

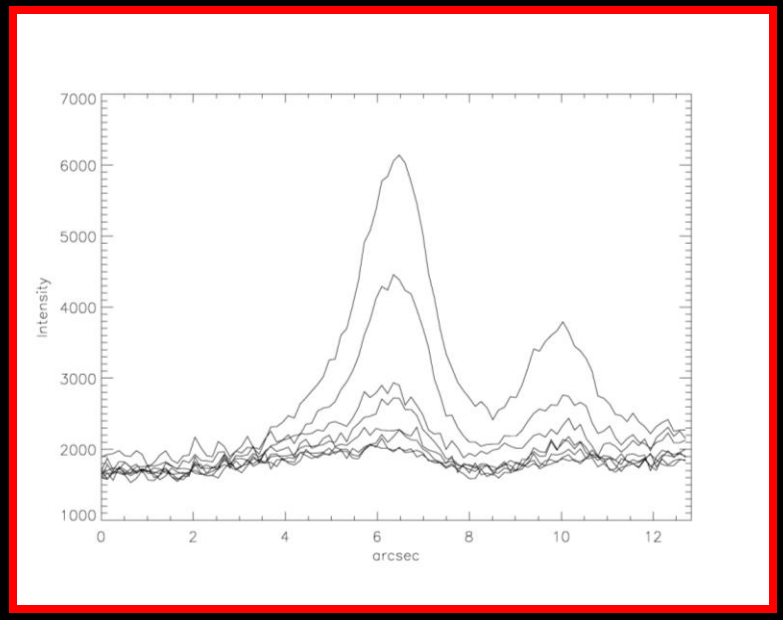
MOCK SPECTRA + OSIRIS TF + GTC EFFICIENCY



LUS: Kinematics of Ionized Structures with OSIRIS TF

OBSERVATIONS

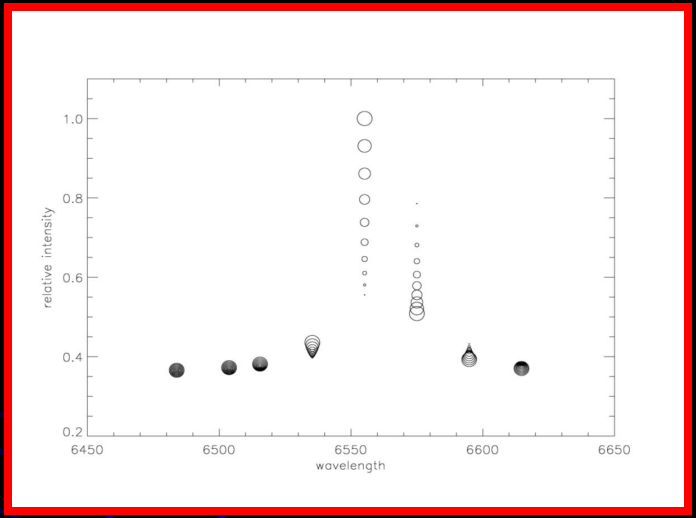


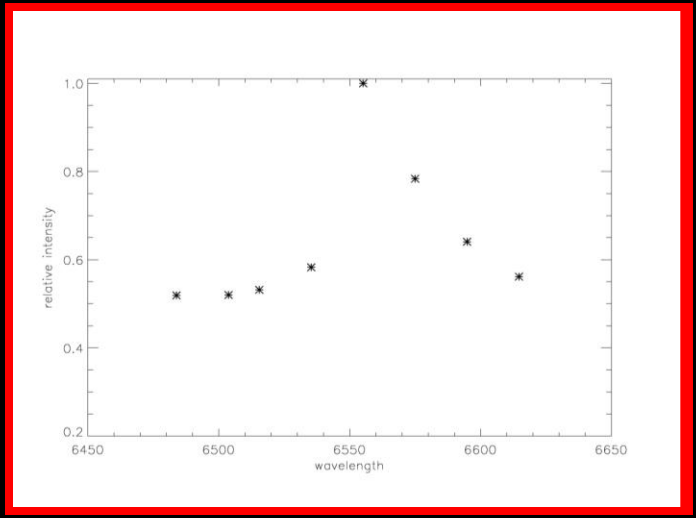


LUS: Kinematics of Ionized Structures with OSIRIS TF

COMPARING

SIMULATIONS vs. OBSERVATIONS





THINGS TO DEAL WITH

- Emission line widths
- Emission line intensities and continua
- Emission lines ratios
- Relative flux calibration
- Gas velocity
- Inhomogeneous PSF
- TFs width and scanning step

LUS: Identifying Ionized Structures with OSIRIS TF

IONIZED RINGS IN M101