RevMexAA (Serie de Conferencias), **42**, 112–112 (2013)

INTEGRAL FIELD SPECTROSCOPY AND MULTI-WAVELENGTH IMAGING OF NEARBY SPIRAL GALAXIES: NGC 5668 AS A PILOT CASE FOR MEGARA

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MEGARA (Multi-Espectrógrafo en GTC de Alta Resolución para Astronomía) is an optical Integral-Field Unit (IFU) and Multi-Object Spectrograph (MOS) designed for the GTC 10.4 m telescope in La Palma. MEGARA will be a 3rd generation instrument for GTC. It is led by the University Complutense of Madrid with the collaboration of INAOE, IAA, UPM and comprises more than 50 researchers from a large number of institutions worldwide.

The scientific goals that have driven the design of MEGARA spam a broad range of interests of the astronomical community from Galactic stellar clusters to high-redshift galaxies. The leading science project of MEGARA is MEGADES (MEGARA Galaxy Disks Evolution Survey) which intend to determine the relative contribution of in-situ star formation, stellar migration, and merging on the distribution of stellar populations and metals in galaxy disks. In this context and in order to improve our understanding of the mechanisms that drive the evolution of disk galaxies, we present the analysis of the spectral cube of the nearby spiral galaxy NGC 5668 obtained with the PPAK Integral Field Unit at the Calar Alto (CAHA) observatory 3.5 m telescope. It consists on a mosaic of 6 pointings, covering a total area of 2×3 arcmin^2 (Figure 1).

From these data we obtain the bidimensional spatial distribution maps of the attenuation of the ionized gas, and chemical abundances of oxygen. We find a mean ionized-gas attenuation of $A_V \sim 1$ mag, with the gas attenuation appearing larger than the continuum attenuation by a factor of 3. While inwards of $r \sim 36'' \sim 4.4$ kpc ~ 0.36 ($\frac{D_{25}}{2}$) the derived O/H ratio follows the radial gradient typical of the disks of spiral galaxies, the abundance gradient beyond $r \sim 36''$ flattens out. The multi-wavelength surface brightness profiles of NGC 5668 are compared with those predicted by chemo-spectrophotometric evolutionary models of galaxy disks in the context of the inside-out scenario of disk formation. Both the deviations of the color profiles and the shape of the metallicity radial distribution indicate that a secondary mechanism, possibly gas transfer induced by the presence of a young bar, must have played a role in shaping the recent chemical and star formation histories of NGC 5668 beyond what is predicted by the inside-out scenario. This study is presented in Marino et al. (2012, ApJ, submitted) and demonstrates the strength of the combination of IFU and multi-wavelength imaging data. With MEGARA, the future optical IFU & MOS for 10.4 m GTC we will fill simultaneously with high spectral resolution and large area coverage the gap currently existing in astronomical instrumentation, addressing this kind of fundamental issues in the study of galactic structure and evolution.

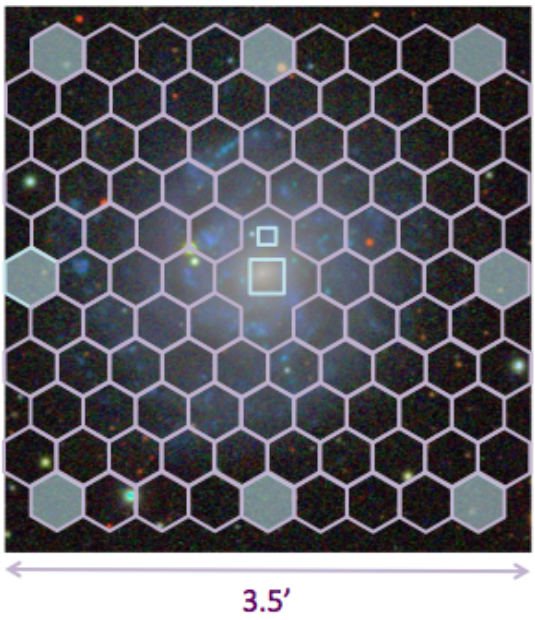

Fig. 1. SDSS optical *ugr* image of NGC 5668 with the MEGARA FOV overlayed. North is up and East is to the left.

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