ELECTRON DENSITIES OF HII REGIONS THROUGHOUT THE NGC 6946 DISK

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ABSTRACT

We have used the tuneable filter system of OSIRIS to observe the [SII] doublet lines at $\lambda\lambda$617.7 and 673.1 nm in emission across the full face of NGC 6946, and estimated the in situ electron densities for 387 HII regions, so far. The values decline steadily from over $350 \text{ cm}^{-3}$ at $\sim 1/3 R_{25}$ to around $175 \text{ cm}^{-3}$ at $2/3 R_{25}$.

Key Words: HII regions — galaxies: individual: NGC 6946 — galaxies: spiral
Fig. 1. Image of the galaxy NGC 6946, using a synthetic, custom filter, by co-adding all the slices in the scanned spectral range. The red circles indicate the position of the detected H II regions where the [SII] doublet was deblended. The green circle indicates the position of the giant H II region NGC 6946-1347, which is a reserved target of the OSIRIS guaranteed time (not be studied here). Several "pseudospectra" for selected H II regions are shown. Clockwise from top right, we show the "pseudospectrum" of an H II region in the low density regime ($n_e < 100 \, \text{cm}^{-3}$), a high density region ($n_e = 950 \, \text{cm}^{-3}$), a low signal to noise region, with a maximum peak of just 700 counts, a region with moderate density ($n_e = 450 \, \text{cm}^{-3}$), and a region with good signal to noise, with a peak well over 400000 counts and an area of 2321 pixels. We note that the a "pseudospectrum" is a convolution of the real spectrum from the H II regions and the response of the instrument OSIRIS, an Airy function. As a first approximation, the profile of the [SII] lines can be fitted using a Voight function. However, in order to obtain a better deblending and more reliable values for the density, it will be necessary to deconvolve the "pseudospectra", which is work in progress.

Further work in progress will refine these results.

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REFERENCES