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THE NATURE OF THE VERY EXTENDED EMISSION LINE REGIONS ASSOCIATED WITH ACTIVE GALACTIC NUCLEI

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We intend to carry out the deepest imaging survey ever undertaken of the extended emission line regions protruding from the nuclei of active galaxies and quasars. The aim is to investigate the full extent of these regions, their origin, and ionizing energy sources. The use of occulting masks, now under consideration for OSIRIS, will aid in blocking out the intense emission from the central regions of the galaxies under study, thereby improving the detection limits of the extended, faint, diffuse regions.

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1. INTRODUCTION

The nature of the very extended emission line regions associated with active galactic nuclei still remains unclear. Low and high ionization components are present in these regions. The low ionization component is thought to be related to the galaxy halo, closer to the disk, and thus it is most probably composed of diffuse ionized gas (DIG). The energy balance mechanism that sustains ionization in these regions remains to be determined. Rozas et al. (this volume, p. 000) discuss the characteristics of the DIG in the inner halo component. On the other hand, the high ionization component extends much further out, and its nature and excitation mechanism are likely to have a different origin from those of the low ionization counterpart. In some cases, such as Seyfert galaxies, the nuclear power law ionizing continuum or collimated radio ejecta may be responsible for the excitation of these regions. In the case of starbust galaxies, the energy injected by the cumulative effects from strongly peaked starbust activity may also play an important role. We intend to make use of the unique capabilities that will be provided by OSIRIS with its relatively large field of view, tunable filters, and the sheer light-gathering power of the GTC to make a thorough emission line mapping of low and high ionization species of these regions.

2. THE STUDY OF EXTENDED EMISSION LINE REGIONS WITH OSIRIS

The GTC + OSIRIS capabilities are ideal for the success of the multi-emission line, continuum-subtracted, deep imaging survey that we intend to perform in the faint ($\sim 10^{-20}$ erg s^{-1} cm^{-2} arcsec^{-2}) external regions of active galaxies at different redshifts. This study will allow us to investigate the ubiquity of the very extended emission line regions in these galaxies, their spatial extent and volumes, the origin of these regions within different formation scenarios, and the possible energy sources that keeps them ionized. The use of occulting masks will provide a distinct advantage to these studies by allowing us to block out emission from the bright galactic core, thus increasing the contrast between the inner and outer regions.

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